1992 IMPLICATIONS of a SINGLE EUROPEAN MARKET

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IMPLICATIONS

OF A SINGLE EUROPEAN MARKET

MINERALS AND METALS

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FOREWORD

The European Community (EC), with a GDP similar to that of the United States, is Canada's second-largest trading partner and source of investment and technology. Canadian companies therefore have a particular interest in the completion of the European Community's internal market. The goal of the Single Market program, or Europe 1992 as it is often called, is the complete removal of barriers to the movement of goods, services, labour and capital within the 12 states of the Community to create a dynamic and rapidly growing market.

External Affairs and International Trade Canada (EAITC) is pleased to present this study as part of a series of reports on the implications of a Single European Market on Canada's trading, investment and technology interests. The areas to be covered by these reports include (in publication order):

Agriculture and Food Products
Consumer Goods and Cultural Industries
Telecommunications and Computers
Automotive Industry
Minerals and Metals
Forest Products
Defence, Aerospace and Transportation
Specialty Chemical Products, New Materials, Pharmaceuticals and Biotechnology
Industrial Products and Services
Financial Services
Fisheries Products
Professional and Consulting Services

These reports, prepared by Raymond Chabot International Inc., BIPE (Bureau d'Informations et de Prévisions Économiques) and Informetrica Ltd. analyse the trends, export impact, competition, investment implications and technological acquisitions arising from the EC Single Market of 1992.

This series of reports complements an earlier study published by EAITC, *1992: Effects on Europe*, which details the major economic and trade effects of the integration. Now in its third printing due to popular demand, the report provides a clear picture of the unification legislation and implementation measures and the general expectations and response of European industry.

Following the publication of these sectoral reports, EAITC will focus on subsectors of Canadian industry in which particular opportunities arise from the Single Market. These studies will go into much more detail on the trade ramifications specific to each subsector.

Together these reports, the overview presented in *Effects on Europe*, the sectoral analyses of this series of studies, and the subsector details of the next phase of Europe 1992 reporting, are not simply an information base for Canadian business people, but can be seen as a call to action. Europe 1992 is happening now. It will affect the way we do business. We have to know about it. And we have to plan to profit from it.

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LIST OF ACRONYMS AND ABBREVIATIONS

EAITC	External Affairs and International Trade Canada
EC	European Community (present Member States are West Germany, France, U.K., Italy, Spain, the Netherlands, Belgium, Denmark, Luxembourg, Greece, Ireland and Portugal)
ECSC	European Coal and Steel Community
ECU	European Currency Unit
EFTA	European Free Trade Association (present members are Sweden, Norway, Iceland, Finland, Austria and Switzerland)
EUROPE 1992	The EC program to create a Single Market by eliminating remaining barriers to trade, by 1992
F.R.G.	Federal Republic of Germany
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GNP	Gross national product
ISTC	Industry, Science and Technology Canada
NIC	Newly industrialized countries
NMC	Non-market country
NTB	Non-tariff barrier
OPEC	Organization of Petroleum Exporting Countries
R&D	Research and development
Semis	Semi-fabricated products
U.K.	United Kingdom
U.S.	United States
U.S.S.R.	Union of Soviet Socialist Republics
VAT	Value-added tax

EXECUTIVE SUMMARY

This report is about the impact on the Canadian minerals and metals sector of the decision by the European Community to complete the development of a Single Market program (Europe 1992). The creation of the Single Market implies the elimination of many existing barriers to intra-EC trade, which, in turn is expected to stimulate an increase in EC output of a quarter-trillion dollars or more. These developments will have an effect on the Canadian minerals and metals sector, although not nearly of an order resembling the anticipated impact on certain high-tech manufactured goods such as telecommunications equipment, computers and biotechnology.

The report begins by describing the EC's net dependence on mineral imports, its attempts at achieving metal producing self-sufficiency, and the state of its trading relations, in minerals and metals, with Canada. Canada as a world leader in mineral production and the leading exporter of a number of minerals and metals enjoys important markets in the EC. The nature of these markets is described in somewhat greater detail through brief synopses of each of the major mineral and/or metal industries in the EC, including non-ferrous-metal industries such as aluminum, copper, zinc, lead and nickel. Special attention is given to the heavily state-aided EC coal and steel industries.

The impact of Europe 1992 on the EC minerals and metals sector is assessed. It is observed that few, if any, of the over 300 directives associated with the EC's goal of creating a Single Market involves the EC minerals and metals sector. Moreover, the trade barriers that Europe 1992 is aimed at eliminating largely side-step the state-aids, including monopoly positions as well as subsidies, that many of the EC minerals and metals industries have enjoyed.

The report then turns to the implications Europe 1992 has for the Canadian minerals and metals sector. Specific industries within the sector are assessed. Canada retains its comparative advantage in mineral and energy-intensive metal production. The "restructuring" of Canadian minerals and metals firms in the early and mid-1980s, which reduced costs and enhanced productivity, has helped position these firms for the increased competition they are likely to face in the next decade.

Finally, the report evaluates the opportunities, risks, and strategies facing Canadian minerals and metals firms arising out of Europe 1992, in particular, and a changing competitive environment, in general. Among the issues discussed are: (a) the role of an EC-presence; (b) the global restructuring of minerals and metals sector firms; (c) the implications of East bloc *perestroika*; (d) EC directives relating to the environmental degradation and health hazards created by smelting, processing and use of minerals and metals; and (e) the development of new materials. The report concludes that the Canadian minerals and metals sector has responded strongly to new developments which could affect its competitive position. The main "cloud" on the horizon may be the tendency for the multilateral General Agreement on Tariffs and Trade (GATT) negotiations to give relatively little attention to barriers to trade in minerals and metals.

INTRODUCTION

This report is about the Canadian minerals and metals sector, and the impact on it of developments now taking place in Europe. The Commission of the European Community has adopted -- or is in the process of adopting -- directives designed to create a Single Market in the EC by the end of 1992 (thereafter called Europe 1992). The proposed Single Market is expected to stimulate an increase in EC output of 4.5 per cent -- or about one-quarter of a trillion dollars.[1] If successful, the EC Single Market will at the very least increase the demand for minerals and metals.

The creation of the Single European Market will be achieved mainly by eliminating numerous non-tariff barriers (NTBs) that have hampered intra-EC as well as extra-EC trade. These NTBs include state aids in the form of subsidies and restrictive government procurement policies, as well as technical barriers in the form of equipment non-compatibilities, varying standards, differing certification and testing procedures, non-transparent regulations, and incomplete or inconsistent protection for intellectual property. While the impact of these barriers on most minerals and non-ferrous metals trade is minimal, state aids are particularly important for coal and steel. Although the impact of Europe 1992 on the minerals and metals sector will certainly not be of an order resembling its impact on certain high-tech manufactured goods, such as telecommunications equipment and computers, the market-oriented trade-liberalizing philosophy embodied in the goal of a Single Market program will influence all sectors of the economy.

1. BACKGROUND AND TRENDS

Historically, the metal industry has been a vital component of European industrialization. In medieval and early modern times, Europe was a supplier of minerals to the world. However, in the twentieth century declining mineral resources have made most of Europe heavily dependent on raw material imports. However, the European metal industry has lost none of its historic importance. Europe remains a centre of sophisticated and technically advanced metallurgy and a home for the training of apprentices in metal-working skills.

To understand the current state of trading relations with the EC in minerals and metals, it is necessary to step back a quarter of a century or more. As part of its postwar re-industrialization program, each Member State wanted its own steel industry, and other metal industries as well. These industries were seen as the backbone to a manufacturing sector which needed to be defended by providing a degree of metal-supply security.

There are two important implications of the industrial policy implied by the desire for metal-supply security. One is some tendency to fragment the European metals industries along largely national lines, even though internal EC trade is tariff-free. Another is to give preferred tariff-free status to the import of ores and concentrates, on which European metals firms are heavily dependent, at the expense of metal imports, which typically face tariffs. Foreign firms wishing to sell metals in the EC were implicitly required to sell concentrates as well in order to supply the needs of EC-based metals producers.

EC Member States have been particularly protective of their coal and steel industries. Some Member States have also given state aid to their aluminum and other non-ferrous metal industries. How far Europe 1992 will go in dismantling this protection is as yet unclear. Nevertheless, the winds of change are already reducing to some degree EC intervention in the steel industry.

Precious metals and the major non-ferrous metals (aluminum, copper, zinc, nickel, tin) are traded in international commodity (auction) markets with prices quoted on the London Metal Exchange. In contrast, steel production is customer-oriented and prices have traditionally been administered by the firms, often on a leader-follower basis. Moreover, the steel industry is strongly related to one other manufacturing industry found in most industrialized countries: automobiles. These differences in marketing and input-output relations, combined with the perception that the iron and steel industry is the backbone to industrialization and an important source of industrial employment, probably contribute to the differences in degree and kind of government intervention in the EC minerals and metals sector. Therefore, the organization of this report distinguishes the minerals and non-ferrous metals industries on the one hand and the steel and closely related coal industries on the other.

For its part, Canada is one of the world's leading mineral producers. For example, Canada is the world leader in the production of nickel, zinc and uranium, the second largest producer of gypsum, asbestos, potash and sulphur, the third largest producer of aluminum, the fourth largest of molybdenum, cadmium and lead, and the fifth largest of silver and gold. Because Canada has a relatively small population, its high world rank as a mineral producer implies that it is also a leader in the export of many minerals and metals, including sulphur, asbestos, zinc, nickel, lead and titanium slag. In addition, Canada is the world's largest exporter of aluminum, a testament to Canada's huge amounts of relatively low cost, hydro-electricity, a key input in the production of aluminum.

In 1988, Canada's minerals and metals exports to the EC amounted to $3.1 billion

-- or 12 per cent of this country's total minerals and metals exports. In turn, Canada imported $1.8 billion of minerals and metals (almost wholly the latter) from the EC. Whereas no one mineral or metal dominates Canada's exports to the EC, 57 per cent of the value of EC exports to Canada are crude or finished iron and steel products and ferro alloys. Canada's main mineral and metal exports to the EC are asbestos, iron ore and titanium slag, aluminum, copper, nickel, zinc, lead, gold and uranium. Lesser but significant exports include sulphur, coal, potash, pig iron and other (than gold) precious metals. Although only about one-eighth of Canada's huge mineral and metal exports are destined for the EC, it is nevertheless an important market.

Canada is also a competitor of the EC in the sale of semi-fabricated and fabricated metal products. However, much of that competition takes place in Canada. The EC accounts for about $1 billion worth of Canadian imports of fabricated metals and metal products. See Table 8.

Since World War II, the minerals and metals sector has gone through three phases; the third is still in its infancy. In the first phase, the postwar reconstruction of the world economy led to a rapid expansion in the production and trade of minerals and metals. This phase culminated in the long period of rapid industrial growth in the 1960s.

The second phase began in the early 1970s when commodity price increases, caused in particular by the quadrupling of oil prices by the Organization of Petroleum Exporting Countries (OPEC), led to recession and a decade-long stagnation in industrial production, which consequently adversely affected the demand for mineral and metal inputs used by industry. Falling demand for minerals and metals and a decline in prices culminated in the deep recession of the early 1980s. The third phase, now under way, is marked by a combination of slow but relatively steady growth and greater production efficiency, the latter the result of recession depression-induced industry restructuring, chiefly through the elimination of high-cost, technologically obsolete capacity.

The three phases in the postwar development of the minerals and metals sector are reflected in production statistics for raw steel. Table 1 indicates that from 1950 to 1974, EC, Western world and total steel production grew steadily -- the level in 1974 was more than three times that in 1950. For the remainder of the 1970s steel production stagnated, and then plummeted in the early 1980s. Since 1983, total steel production has slowly recovered to its 1974 level. However, United States (U.S.) and EC production levels are still well below 1974 levels, their share of the world market falling at the expense of newly industrialized countries (NICs) and non-market countries (NMCs), particularly China.

A similar picture applies to most minerals and to non-ferrous metals, although the 1970s peak was often reached somewhat earlier than 1974. The stagnation of minerals and metals production in the 1970s and early 1980s is reflected in declining Canadian exports to the EC, as Table 2 indicates. The decline in Canadian exports to the EC is particularly large for asbestos, copper, nickel and aluminum. Only EC imports of Canadian coal and potash have continued to increase throughout the period. In each case, the growth was from a very low base in the 1960s.

Tables 3 to 6 give a 1987 snapshot of Canadian exports and imports of minerals and metals -- and the share accounted for by the EC. Canada is an important producer and exporter of iron, copper, nickel, zinc and lead ores and/or concentrates, and of asbestos and sulphur. Table 3 indicates that except for copper concentrates and sulphur, the EC accounts for a significant proportion of Canadian exports of these minerals. The EC has been for years Canada's most important market for nickel.

Table 4 shows that the EC accounts for only a small proportion of Canadian exports of metals, with the exception of primary iron and steel, platinum and refined copper. As we shall see, many European metals industries are highly developed, with import reliance mainly in the form of the raw materials required for processing and fabricating. Nevertheless, Canada accounts for a significant proportion of EC imports of asbestos, sulphur, nickel, lead, zinc and potash, as Table 5 indicates. Leading Canadian producers are listed in Table 6.

To complete the picture, Tables 7 and 8 present figures on Canadian imports of minerals and metals. As might be expected, Canada's imports of mineral ores are negligible, except for bauxite used in the production of aluminum, transborder shipments of iron ore from northern Minnesota, and some precious metals. Table 7 shows that the EC accounts for only a minuscule fraction of what for the most part are small Canadian imports of mineral ores.

The picture for Canadian imports of metals is only slightly different from that of ore imports. Table 8 shows that Canada conducts a substantial trade in aluminum, copper, gold and gold alloys, although the EC's role in this trade is negligible. In contrast, the European Community accounts for one-third of Canada's substantial imports of iron and steel, although even here, Canada is a net exporter to the world as a whole.

Canadian trade in minerals and metals with the EC is influenced by the EC's structure of external tariffs. The EC is both a common market and a customs union in which each Member State has a common external tariff. Broadly, raw materials (ores and concentrates) enter the EC duty-free, with tariffs escalating as one moves from processing to fabricating. There are, however, exceptions to this picture. Canadian copper exports to the EC in the forms of concentrate, scrap or refined metal are duty free, although copper semi-fabricated goods face duties of 5 to 6 per cent. Nickel in matte or metal form also enters the EC duty-free. In contrast, exports of aluminum, lead and zinc in metal form face tariffs running from approximately 3 to 6 per cent, and steel faces EC import quotas as well as tariffs.

TABLE 1

World Raw Steel Production by Major Area, 1950-1986
(in millions of tonnes)

	EC[a]	U.S.	Western World[b]	Non-Market Economies	TOTAL
1950	48.3	87.8	153.0	35.6	188.5
1953	57.3	101.2	184.3	50.1	234.3
1955	72.8	106.1	210.2	59.4	269.6
1957	82.0	102.2	219.5	72.3	291.8
1960	97.9	90.1	241.0	105.1	346.2
1963	96.5	93.7	268.6	114.4	383.0
1965	113.9	119.3	324.0	132.5	456.4
1967	114.6	115.4	346.6	150.2	496.8
1970	137.6	119.3	418.5	175.0	593.5
1971	128.2	109.2	394.6	185.9	580.5
1972	139.2	120.8	434.3	195.8	630.0
1973	150.1	136.8	491.3	206.2	697.5
1974	155.6	132.2	494.9	215.3	710.2
1975	125.3	105.8	423.9	222.0	645.9
1976	134.6	116.0	452.6	222.7	675.3
1977	126.6	113.7	443.3	232.2	675.4
1978	133.3	124.3	468.6	248.2	716.8
1979	141.0	123.7	496.9	249.7	746.5
1980	128.6	101.4	463.8	252.4	716.1
1981	126.3	109.6	460.0	247.6	707.5
1982	111.4	67.7	398.4	246.4	644.7
1983	109.4	76.7	407.7	256.1	663.1
1984	120.2	83.9	446.0	264.0	710.0
1985	120.7	80.1	450.2	269.2	719.3
1986	110.6	74.0	429.5	282.5	712.0

Source: American Iron and Steel Industry, *Annual Statistical Reports*, various issues.

[a] EC statistics are for nine Member States; excluded are Greece, Spain and Portugal, the newest EC members.

[b] Of which Japan has accounted for approximately one-quarter, since the early 1970s.

TABLE 2

EC Imports from Canada
(in thousands of tonnes)

	Year						
	1963	1970	1975	1980	1987	1987 / 1963	1987 / 1970
Asbestos	263.4	385.8	503.4	561.1	159.9	0.61	0.41
Sulphur	2.6	245.1	664.4	639.5	423.9	161.30	1.73
Copper	116.0	169.7	191.2	178.6	93.0	0.80	0.55
Nickel	78.7	123.4	101.2	51.3	59.1	0.75	0.48
Lead	32.7	81.2	48.6	29.9	63.8	1.95	0.79
Zinc	28.6	428.1	440.6	302.5	425.9	14.89	0.99
Aluminum	197.4	219.2	31.8	36.9	29.2	0.15	0.13
Coal	0.7	127.6	917.9	831.4	1 574.8	2 211.10	12.30
Potash	0.2	3.8	5.6	7.3	42.8	214.00	11.30
Gold (in thousands of $US)	0	0	0	29.8	136.9	-	-

Source: Interdepartmental Working Group on Minerals and Metals, *The Impact of Europe 1992 on Canada's Minerals and Metals Sector*, Ottawa, May 1989 (mimeo). Various appendix tables.

TABLE 3

Canadian Exports of Minerals in Their Primary Forms, 1987
(millions of dollars)

Crude Materials	Total Production[a]	Exports	Exports to EC	Exports to EC as Percentage of Total Production	Exports to EC as Percentage of Total Exports
Metal Ores	10 962.1	3 920.5	1 305.9	11.9	33.3
Iron	1 395.6	1 120.4	478.6	34.2	42.7
Copper	1 923.1	720.5	38.9	2.0	5.4
Nickel	1 273.0	510.5	187.6	14.7	36.7
Gold	2 204.5	129.9	22.7	1.0	17.5
Other precious metals	605.9[b]	310.7	157.3	26.0	50.6
Zinc	1 475.2	304.1	202.6	13.7	66.6
Lead	394.8	89.6	41.2	10.4	46.0
Radioactive ores	1 182.2	278.0	50.6	4.3	18.2
Other	509.0	243.6	121.3	23.8	49.8
Coal		1 670.0	103.2	6.3	6.2
Other Crude Non-Metal Ores					
Asbestos	237.9	363.8	106.8		29.3
Sulphur	603.0	885.2	91.0		10.3
Other Waste and Scrap Materials	N/A	129.6	4.4		3.4

Source: Informetrica tables.

[a] A substantial portion of total mine production is destined for export only after it is smelted or refined. Therefore it is not reflected in the export columns in this table, but is a substantial portion of the value of exports shown in Table 4.

[b] Silver and platinum.

N/A Not applicable.

TABLE 4

Canadian Exports of Metals, 1987
(in millions of dollars)

	Exports	Exports to EC	Exports to EC as Percentage of Total Exports
Fabricated Materials (Metals)			
Iron and steel	2 668.0	71.6	2.7
Ferro alloys	34.6	0.6	1.7
Primary iron and steel	181.6	55.2	30.3
Castings and forgings	196.6	0.7	0.3
Rolling mill products	1 603.5	11.6	0.7
Other	651.8	3.4	0.5
Non-Ferrous Metals	6 423.1	317.3	4.9
Aluminum	2 751.7	34.3	1.2
Copper	811.9	173.3	21.3
Lead	105.1	28.5	2.7
Nickel	664.5	8.9	1.3
Platinum	28.1	17.8	63.3
Silver	163.6	0.5	0.3
Gold	1 199.9	2.6	0.2
Gold alloys	124.2	0.0	0.0
Other precious metals	0.5	0.0	0.0
Zinc	484.4	35.3	7.3
Other non-ferrous metals	89.1	16.0	17.9
Fabricated Metal Products	1 012.1	59.0	5.8

Source: Informetrica tables.

TABLE 5

EC Imports from Canada as a Percentage of Total EC Imports from Outside EC

	1963	1970	1980	1987
Asbestos	53.6	54.0	66.9	64.7
Sulphur	0.3	12.5	30.2	32.0
Iron and steel	7.2	11.7	14.0	13.9
Copper	8.4	9.2	8.6	5.0
Nickel	75.4	65.8	30.4	35.2
Lead	14.7	27.4	13.6	21.1
Zinc	5.7	51.7	33.3	36.8
Aluminum	37.7	19.9	3.7	2.6
Coal	0.0	0.4	1.0	1.8
Gold	0.0	0.0	0.6	3.1
Potash	0.9	9.3	3.6	19.7

Source: Minerals and Metals Working Group, Memorandum, May 10, 1989, selected tables.

TABLE 6

Leading Canadian Producers of Minerals and Metals

Aluminum	Copper	Nickel	Lead/Zinc	Iron and Steel
Alcan Aluminium Ltd.	Noranda Minerals Inc.	Inco Ltd.	Cominco Ltd.	Stelco Inc.
Canadian Reynolds Metals Co. Ltd.[a]	Inco Ltd.	Falconbridge[b]	Noranda Minerals Inc.	Dofasco Inc.
Aluminerie de Bécancour Inc.(ABI)[a]	Falconbridge Ltd.[b]	Sherritt Gordon	Hudson Bay Mining and Smelting	Algoma Steel Corp.[c]
	Hudson Bay Mining and Smelting[a]			Sidbec Dosco Ltée
	Gibraltar Mines Ltd.			Lake Ontario Steel
				Sydney Steel Corp. (SYSCO)
				IPSCO

Source: ISTC Industry Profiles and interviews.

[a] Foreign-owned.
[b] Taken over by Noranda and a Swedish firm, Trelleborg, in 1989.
[c] Acquired by Dofasco in 1988.

TABLE 7

Canadian Imports of Mineral Ores, 1987
(in millions of dollars)

	Domestic Consumption[a]	Total Imports	Imports from EC	Imports from EC as Percentage of Domestic Consumption	Imports from EC as Percentage of Total Imports
Metal Ores	8 686.2	1 643.6	65.1	0.7	4.0
Iron and steel	608.3	333.1	0.2	[b]	0.1
Aluminum	337.6[c]	550.7[c]	33.6	9.9	6.1
Copper	1 379.7	177.1	3.6	2.6	2.0
Nickel	802.8	40.3	8.3	1.0	2.1
Gold	2 093.8	19.2	1.4	0.1	7.3
Other precious metals	641.0	345.8	12.0	1.9	3.5
Zinc	1 188.3	17.4	0.6	[b]	3.4
Other	1 634.7	159.9	5.4	0.3	3.4
Coal	696.2	724.9	0.0	0.0	0.0
Other Crude, Non-Metal Materials		371.9	15.0	4.0	
Asbestos		0.4	0.0	0.0	0.0
Phosphate rock		73.0	0.0	0.0	0.0
Sulphur		4.9	0.0	0.0	0.0
Other Waste and Scrap Materials	171.7	2.1	-	1.5	

Source: Informetrica tables.

[a] Domestic Consumption = Production (from Table 3) + Imports - Exports (from Table 3). Note that a substantial portion of domestic consumption of minerals ends up in smelted or refined product exports.
[b] Less than one-tenth of 1 per cent.
[c] Bauxite.

TABLE 8

Canadian Imports of Metals, 1987
(millions of dollars)

	Total Imports	Imports from EC	Imports from EC as Percentage of Total Imports
Fabricated Materials (Metals)			
Iron and steel	2 076.9	670.9	32.3
Ferro alloys	123.5	16.0	12.9
Primary iron and steel	218.3	150.1	68.7
Castings and forgings	148.8	9.1	6.1
Rolling mill products	1 120.2	401.3	35.8
Other	466.1	94.5	20.3
Non-Ferrous Metals	2 485.2	145.2	5.8
Aluminum	868.7	78.2	9.0
Copper	234.9	24.7	10.5
Lead	15.5	1.1	7.1
Nickel	66.9	10.2	15.2
Platinum	65.1	7.9	12.1
Silver	38.6	0.3	0.7
Gold	547.8	0.3	0.05
Gold alloys	470.3	0.5	0.1
Other precious metals	17.1	0.1	0.6
Tin	36.1	1.2	3.3
Zinc	22.2	8.8	39.6
Other non-ferrous metals	102.0	11.9	11.7
Fabricated Metal Products	1 736.6	166.1	9.6

Source: Informetrica tables.

2. THE MINERALS AND METALS SECTOR IN EUROPE

Europe, the world's smallest continent, is not a major mineral producer, with the important exception of coal and other mineral fuels such as oil and gas. But Europe, the birthplace of the Industrial Revolution, is an important metal producer and fabricator. The iron and steel industry is one of the best known of the European metal industries. Important, if relatively less known, are European non-ferrous metal industries, including aluminum, zinc, copper, nickel, lead, molybdenum and gold, and non-ferro alloys such as brass. Table 9 presents an overview of EC mineral mining and metal processing and fabricating activity.

What follows is a brief synopsis of each of the major mineral and/or metal industries in the EC, with a focus on the degree to which there is intra-Community self-sufficiency or, alternatively, a net EC dependence on metal imports. Somewhat more attention will be given to the EC iron and steel industry, not only because of its central role in European industrialization and postwar rebuilding, but because it has been the target of numerous government policies.

TABLE 9

Mineral Mining, Processing and Fabricating Activity in the EC

	Mining	Processing[a]	Fabricating
Iron and steel	x	xx	xx
Aluminum	x[b]	xx[c]	xx
Copper	[d]	xx	xx
Lead	x	xx	
Nickel	x[e]	x	
Zinc	x[f]	xx	xx
Precious metals			x
Coal	x	N/A	N/A
Sulphur			N/A
Asbestos			N/A

Source: *Panorama of EC Industry 1989*, and *Europe in 1993: Economic Outlook by Sector*, BIPE, Paris.

N/A Not applicable.

[a] Smelting and/or rolling.
[b] Bauxite deposits in France.
[c] Includes alumina smelters in Ireland and Spain as well as primary aluminum smelters in several countries including U.K., France, West Germany and Italy.
[d] Negligible amounts in several EC Member States.
[e] Greece.
[f] Relatively small quantities in several EC Member States.

x Found in fewer than half of EC Member States.
xx Found in at least one-half of EC Member States.

2.1 Aluminum

The EC has a well-developed aluminum industry, with nearly all Member States producing and/or fabricating aluminum. During the past two decades the EC aluminum industry has made considerable efforts to rationalize and modernize its existing installations, introduce new techniques, and close down smaller, high-cost smelters. Nearly all EC aluminum rolling mills are part of integrated firms with fabricating plants producing semi-fabricated products (semis) and/or finished products.

The EC is the world's second largest (after the United States) consumer of aluminum. It imports approximately one-third of its primary aluminum requirements, chiefly from Norway, Australia and Brazil. Although Canada is the world's largest exporter of aluminum, only a small amount currently finds its way to the EC. At one time, however, large amounts of Canadian aluminum were shipped to the EC. But two decades ago trade patterns changed. The change in trade patterns was attributable to (a) Canada's loss of duty-free entry into the United Kingdom (U.K.) when the latter joined the Common Market; (b) rapid expansion of EC aluminum smelting capacity, some of it subsidized, much of it state-owned, employing the world's most energy-efficient technology; (c) investments in Europe, primarily alumina capacity in Ireland and aluminum smelter capacity in the U.K., by Alcan, Canada's largest aluminum producer; and (d) the Eastern bloc countries have become net exporters of primary aluminum at prices conditioned by hard currency requirements rather than costs of production. Although the EC emphasis on building its own smelting capacity was reversed a decade ago, Canadian aluminum exports were unable to regain large scale access to the EC market.

Although the EC, like the U.S., is a net importer of primary aluminum, the EC is a net exporter of aluminum semi-fabricated products. Table 10 matches the EC against aluminum exporter nations -- each of them having the advantage of lower energy costs. It suggests that the EC's large net imports of primary aluminum feed highly developed, efficient, and much less energy-intensive downstream fabricators who have effectively penetrated foreign markets. One of these is the Canadian market. Canada's bilateral trade is heavily balanced in favour of the EC, in good part due to the EC's 6 per cent tariff on aluminum ingots and 7 to 10 per cent tariffs on aluminum semi-fabricated goods. Table 11 summarizes Canadian primary aluminum trade with the EC.

2.2 Copper

The EC is the world's second leading producer of refined copper and its leading producer of copper and copper alloy semis (see Tables 12 and 13). Most EC Member States produce semis, including wire, rolled products (sheets strip, circles), tubes, rods, bars and profiles, in quantities closely attuned to their own manufacturing needs and end-using features. As a result, intra-EC trade is relatively small compared to extra-EC exports of copper semis and products.

In 1986 more than 80 companies, of widely varying size, made up the EC copper semis industry. Although the industry was burdened by a degree of excess capacity in the 1980s, EC copper producers are highly competitive and unprotected by external tariffs. The EC copper semis industry is considered to be advanced technologically -- the result of major investments and industry rationalization. However, future industry growth is likely to be limited because of the search for economy among various end-user manufacturers and the miniaturization of dimensions (thickness, diameters, etc.) in many of the semis produced.[2]

The EC market is an important one for Canadian copper producers. Although Canada accounts for less than 10 per cent of the EC's huge appetite for refined copper and concentrates, the EC is the

TABLE 10

Aluminum Production and Exports: EC and Leading Exporter Nations, 1986 (in thousands of tonnes)

	Primary Aluminum		Semis	
	Production	Exports	Production	Net Exports
U.S.A.	3 038	-1 139[a]	5 178	-290[a]
EC	2 341	-1 280[a]	3 403	213
Canada	1 360	1 100	300	100
Australia	875	585	260	50
Brazil	757	323	453	35
Venezuela	435	247	174	103
Gulf States	330	300	40	30

Source: *Panorama of EC Industry 1989*, pp. 2:10, 2:11.

[a] Net imports.

TABLE 11

Source and Destination of Canadian Imports and Exports of Primary Aluminum (percentage of total value of shipments)

	EC	U.S.	Asia	Other	Total
Imports					
1982	10.2	85.5	0	4.3	100.0
1984	31.5	59.0	0	9.5	100.0
1986	9.5	78.9	0	11.6	100.0
Exports					
1982	1.4	51.9	42.9	3.8	100.0
1984	3.0	75.3	19.9	1.8	100.0
1986	3.5	75.5	16.2	4.8	100.0
1988	4.8	79.9	12.2	3.1	100.0

Source: ISTC, Industry Profile 3010, p. 6 for 1982, 1984, 1986; *World Metal Statistics*, London, June 1989, (for 1988 export data).

TABLE 12

Production of Refined Copper
(in thousands of tonnes)

	1984	1987
EC	1 219.5	1 299.1
Rest of Europe	257.7	254.3
Canada	504.3	528.7
U.S.	1 489.5	1 890.5
Japan	935.2	955.1
U.S.S.R.	1 380.0	1 430.0
Rest of World[a]	3 768.9	3 824.5
Total	9 551.1	10 181.8

Source: *World Metal Statistics*, p. 35.

[a] Sixteen countries, of which Chile produced 879.7 and 970.3 thousand tonnes in 1984 and 1987 respectively.

TABLE 13

World Production of Copper and Copper Alloy Semis
(in thousands of tonnes)

	1984	1986	1987	Percentage Distribution 1987
EC	3 463.0	3 519.0	3 567.3	36.4
U.S.	2 605.9	2 492.9	2 699.0	27.5
Canada	225.8	239.9	262.5	2.7
Japan	2 001.9	1 885.9	1 998.1	20.4
Other Countries	1 164.7	1 398.3	1 272.3	13.0
Total	9 461.3	9 536.0	9 799.3	100.0

Source: *World Metal Statistics*, p. 44.

destination of about one-third of Canada's exports of refined copper. In fact, two EC firms, British Petroleum PLC and Metallgesellschaft AG have copper mining subsidiaries in Canada. Overall, the EC's production of copper and copper alloy semis substantially outstrips its consumption requirements. As a result, the EC is a substantial net exporter of copper product to less developed countries -- totalling 343 000 tonnes in 1986.

2.3 Zinc

Some EC zinc producers are strongly vertically integrated, the same firms extracting, smelting, refining and producing semi-finished zinc-using products. But there are also many "custom smelters" that purchase concentrates chiefly from offshore producers and sell the inwrought metal to fabricators and other end users. Because Ireland and Spain are the only EC countries in which substantial zinc mining is carried out, the EC is heavily dependent on the import of zinc ores and concentrates. While some primary zinc comes from EC-owned facilities abroad, such as British Petroleum PLC's mine in Canada, most is purchased at arm's length. Canada, as the world's largest producer of zinc, is an important source -- contributing about 40 per cent of EC imports. In 1987, Canada's exports, to the EC, of zinc in concentrate form were 426 000 tonnes, while only 34 600 tonnes were shipped as unwrought metal.

Except for its reliance on mineral imports, the EC zinc ingot industry is self-sufficient, as Table 14 indicates. In fact, because EC production of zinc ingots exceeds EC consumption, the industry is a net exporter of zinc. The major use of zinc is in galvanizing steel -- a process that reduces corrosion in the latter. Because of the decline in steel production after 1974, the EC zinc industry has been plagued by excess capacity. Recently, the Commission of the EC has encouraged the phasing out of some smelters -- although with little success. However, in 1988 the merger of two smelter firms led to the closure, in the Federal Republic of Germany (F.R.G.), of one of the smelters.

2.4 Nickel

The EC is heavily dependent for its nickel requirements on imports. See Table 15. Nickel is used primarily in alloys with 50 per cent of the metal used in the production of stainless steel. In 1987, 35 per cent of EC imports of nickel came from Canada. As a result, the EC was Canada's most important market for nickel until 1986, when the EC was eclipsed by the U.S. At one time EC dependence on Canadian nickel was much greater than it is now. Prior to 1970, EC nickel import dependence on Canada exceeded 70 per cent, standing at 75 per cent in 1963.

The decline in EC dependence on Canadian nickel mirrors the loss of Canada's dominant share of world nickel supply to nickel produced in less developed countries, often by state-owned firms. Where two decades ago Canada was the world's pre-eminent producer of nickel, in 1986, Canada and the Soviet Union (U.S.S.R.) each accounted for 22 per cent of nickel mine production. Another 29 per cent was contributed by Australia (10 per cent), Indonesia (9 per cent), New Caledonia (5 per cent) and Cuba (5 per cent).

Nickel is shipped by Canada to the EC in two main forms. Non-refined, nickel-copper matte is shipped to the U.K. and Norway for smelting. In dollar value, though not in tonnage terms, most nickel shipped to the EC is refined metal.

In either form, nickel enters duty-free into the EC. While there are no non-tariff barriers to trade in nickel, environmental regulations in the EC pose some threat to the nickel industry. Recent studies have indicated that nickel refining is carcinogenic and that exposure to nickel or its compounds may be carcinogenic. As a result, some EC Member States have

TABLE 14

EC Zinc Production and Consumption
(in thousands of tonnes)

	1982	1984	1986	1987
Mining production	675	723	700	680
Ingot production	1 424	1 562	1 632	1 671
Ingot consumption	1 338	1 450	1 475	1 492
EC consumption as a percentage of non-communist world consumption	N/A	31.4	30.4	29.7
EC consumption as a percentage of world consumption	N/A	22.4	22.0	21.7

Source: *Panorama of EC Industry 1989*, pp. 2:5, 2:6.

N/A Not applicable.

TABLE 15

Refined Nickel Production and Consumption, 1987

	Refined Nickel Production		Refined Nickel Consumption	
	Thousands of Tonnes	Percentage Distribution	Thousands of Tonnes	Percentage Distribution
EC	45.4	5.8	207.4	24.5
Rest of Europe	63.5	8.1	41.2	4.9
Canada	131.5	16.9	11.8	1.4
U.S.	-	0	148.3	17.5
Japan	91.6	11.7	153.9	18.2
U.S.S.R.	191.0	24.5	138.0	16.3
Rest of World[a]	256.9	32.9	146.2	17.3
Total	779.9	100.0	846.8	100.0

Source: *World Metal Statistics*, pp. 91, 92.

[a] Sixteen countries.

moved to regulate, or even to ban, imports of certain nickel compounds.

2.5 Lead

The EC is the world's leading producer and consumer of refined lead, accounting for about one-quarter of world production and consumption (see Table 16). Lead is refined in almost all EC Member States. However, with limited lead mine production the EC must import large quantities of lead concentrates and bullion. Canada, the third largest producer of lead (after the U.S.S.R. and Australia) is the world's largest exporter of lead ores and concentrates. About one-third of Canada's exports of lead are destined for the EC, chiefly Belgium and West Germany. The major use of lead is in batteries for automobiles and other vehicles. Lead is one of several minerals (including nickel, asbestos and cadmium) whose future usage has been questioned because of research suggesting it is a health hazard -- in most cases because of apparent carcinogenic properties.

2.6 Precious Metals

Although precious metals mining is virtually non-existent in Western Europe, the EC is a world leader in the refining and fabricating of precious metals. Precious metals include gold, silver and platinum. The EC is an important market for Canadian precious metal ores, particularly platinum and silver. Precious metals refiner-fabricator firms are found in 7 of the 12 EC Member States.

2.7 Asbestos

Asbestos is one of Canada's more important mineral exports. In 1987, the EC was the second largest market (after Asia) for Canadian asbestos exports -- accounting for one-quarter of the dollar value of Canadian asbestos exports -- making it an extremely important market in an increasingly asbestos-sceptical world. Until recently, EC directives had attempted to blunt the growing concerns about the health and environmental hazards of asbestos. Thus, EC directives in the late 1970s and early 1980s took the position that (a) low levels of asbestos

TABLE 16

Lead Production and Consumption, 1987

	Percentage of World Mine Production	Percentage of World Refined Production	Percentage of World Consumption
EC	5.7	24.3	24.7
Rest of Europe	5.3	4.3	4.5
Canada	12.1	4.0	1.8
U.S.	9.3	18.2	21.5
Japan	0.8	6.0	6.8
U.S.S.R.	14.9	13.8	13.9
Rest of World	51.9	29.4	26.8
Total	100.0	100.0	100.0

Source: *World Metal Statistics*, pp. 71-73.

exposure would not create undue health hazards and (b) asbestos is only an occupational health hazard, not an environmental health hazard.[3]

However, the belief that asbestos is a carcinogen will not go away. Parallelling developments in the U.S., where the Environmental Protection Agency (EAA) is pushing for a total ban on the use of asbestos by 1997, some EC Member States have begun to enunciate their own asbestos policies. In 1986, Denmark banned the use of asbestos friction materials, thereby contravening an EC directive. The F.R.G. is now considering reclassifying asbestos from a Class II to a Class I carcinogen. Doing so would represent a de facto ban on the importation, sale and use of asbestos and asbestos products, since a Class I classification calls for zero exposure.

The EC's response to the asbestos bans has been twofold. While it initially considered combatting the Danish ban before the European Court of Justice on the ground that it contravenes an EC directive, the Commission recently decided not to challenge Denmark. Instead the EC will tighten its directives on asbestos. Thus, the EC is looking for some common ground on which to frame future rules on asbestos use. It is likely, then, that as part of the general harmonization of directives underlying the Single Market program there will be new regulations relating to asbestos. Given the sceptical climate of opinion currently surrounding asbestos, it is unlikely that amendments to existing directives or any new EC directives will be as sanguine about the effects of asbestos as were the previous ones.

2.8 Potash

The EC imports substantial quantities of potash. In recent years Canada has accounted for about one-fifth of the EC's imports of potash from non-EC sources. Nevertheless, there are some factors inhibiting such trade. There has been a history of European potash cartels dating back to the nineteenth century. While the cartels no longer exist, the potash industries of France, Spain and West Germany are effectively monopolies -- with control by single organizations. In France and Spain these are state organizations. In France, the state-owned firm not only enjoys a production monopoly, but is that country's sole distributor and vendor of potash. Thus fertilizer firms in France, which use potash as a key input, are bound to purchase their requirements from the state-owned firm and cannot look to other non-French suppliers.[4] The French potash case is a good example of how a restrictive practice can act as both a "state aid" (to the industry involved) and a very effective barrier to trade.

2.9 Uranium

The EC Member States generate approximately one-third of their electricity from nuclear power. France's electricity industry is, for example, heavily dependent on nuclear power. An important reason is the uranium mines located in France and its former African territories of Gabon and Niger. These supply approximately 40 per cent of EC uranium requirements. Another 20 per cent is supplied by Canada. In fact, the EC accounts for about 30 per cent of Canada's uranium exports.

Uranium, like potash, is another example of how state-created restrictive practices can interfere with intra-EC as well as extra-EC trade. France would like to deliver some of its uranium-generated electricity to West Germany. However the state-owned West German electricity industry contracts to purchase its energy-generating requirements from the partially state-owned and heavily subsidized West German coal industry. Here again state monopolies serve as an implicit form of protection for a mineral (in this case coal) industry.

2.10 Iron and Steel

The European Community is the Western world's largest steel-making bloc. It is the

second largest consumer of steel after the United States. In 1987, the EC steel industry accounted for 15.6 per cent of world output compared to 13 per cent for Japan and 11 per cent for the U.S. As Table 17 indicates, the EC and Japan were substantial net exporters of steel, while the U.S. was a substantial net importer. Canada's net trade position with the EC reflects the latter's net exporter position (see Table 18), although Canada is, overall, a net exporter of steel.

These figures mask the crisis that has convulsed the European steel sector since 1974. Recall from Table 1 that world steel production peaked in 1974, and with the exception of the late 1970s did not exceed 1974 levels until 1985. In the meantime, EC as well as U.S. steel production has more or less steadily receded from 1974 levels. Unfortunately, EC steel-making capacity continued to increase until 1979, reflecting in many cases ambitious expansion plans mapped out in the early 1970s, often with government encouragement and aid.

By the late 1970s, the EC steel industry was burdened by huge amounts of excess capacity. In 1981, excess capacity in the EC steel industry was estimated at 50 million tonnes, from which there has been only slow recession. Thus in early 1988 EC excess steel-making capacity still stood at 30 million tonnes, compared to 1987 EC steel production of 115 million tonnes.[5]

The massive increase in excess capacity in the late 1970s, a combination of inflexible investment decisions and declining demand, was not the only problem facing the EC steel industry. When the steel crisis struck, the industry was also weakened by overemployment and numerous antiquated facilities, often located at inland sites that could not take advantage of the lower transportation costs afforded seaside locations.[6] The result was that large segments of the EC steel industry were threatened by imminent collapse.

Member States and the European Commission rushed to the rescue. After 1975, European governments poured billions of dollars into the EC steel industry to prop up failing producers. In some cases, steel firm ownership was transferred to governments. From 1980 to 1985 more than $35 billion of subsidies in the form of grants, loans and loan guarantees (see Table 19) were given to the steel industry with the blessing, however mixed, of the European Commission. For its part, the EC introduced a system of minimum prices to complement its voluntary production restraints. These rescue efforts, however, distorted steel industry decision-making and did nothing to eliminate excess capacity. By 1980, the EC had decided it would have to play an even more active role if the precarious course taken by the steel industry was to be reversed.

In October 1980, the European Commission declared a state of "Manifest Crisis" in the Community steel industry. Mandatory production quotas were instituted and did much to cushion the adverse impact of the world recession in 1981 and 1982. But the EC recognized that the steel problem was secular, not cyclical. The quid pro quo to the production quotas would have to be the elimination of excess steel-making capacity.

Between 1980 and 1987, about 32 million tonnes of raw steel-making capacity were phased out. In its early stages the program of excess capacity elimination worked reasonably well as smaller, high-cost, non-integrated mills were closed. However, EC Member States began to balk at the further closure of larger integrated mills. The EC at first responded with threats to penalize recalcitrant producers with smaller production quotas. In 1985, when the Commission's steel portfolio was taken over by Karl-Heinz Narjes, a new policy was signalled. The system of market controls would be phased out and market forces would be left to solve the

TABLE 17

International Comparison of Production, Exports and Imports of Steel, 1987
(in millions of tonnes)

	Production of Crude Steel	Exports of Finished Product	Imports of Finished Product
Total	735.0	135.0	135.0
Community	115.0	20.0	8.0
U.S.	81.0	0.7	15.0
Japan	99.0	22.0	3.0
Others	440.0	92.0	109.0
Of which Brazil	22.0	4.0	0.5
Percentages			
Total	100	100	100
Community[a]	16	15	6
U.S.	11	1	11
Japan	13	16	2
Others	60	68	81

Source: *Panorama of EC Industry 1989*, Table 1, p. 3:2.

[a] Excluding Spain and Portugal.

TABLE 18

Canada/EC Steel Trade, 1979-88
(in thousands of tonnes)

	EC Exports to Canada	EC Imports from Canada
1979	607	144
1980	238	221
1981	950	98
1982	248	354
1983	304	53
1984	700	95
1985	809	56
1986	456	35
1987	1 335	33
1988	1 700	97

Source: Statistics Canada, *Exports by Commodity* Cat. No. 65-004.

TABLE 19

Subsidies to the Community Steel Industry Cleared for Payment by the Commission between January 1980 and December 1985 (in millions of US$)

	Grants	Loans	Low-Interest Loans	Loan Guarantees	Other	Total
Cockerell-Sambre (Bel.)	87	1 171	185	772	-	2 216
Other Belgian	77	32	-	164	-	273
Danish Steel	-	39	-	-	42	80
Arbed Saarstahl (F.R.G.)	834	-	1	172	29	1 035
Other German	1 946	-	66	753	-	2 766
Sacilor/Usinor	148	8 207	-	685	-	9 040
Irish Steel	42	160			-	202
Finsider (Ital.)	793	6 637	2 888	504	-	10 823
Other Italian	2 215	-	27	224	-	2 466
Arbed/MMRA (Lux.)	209	163	-	135	-	507
Hoogovens (Neth.)	88	220	-	-	-	308
Other Dutch	8	-	-	-	-	8
British Steel	225	5 287	-	-	-	5 513
Other U.K.	65	-	-	-	-	65
Total	6 740	21 915	3 167	3 409	70	35 302

Source: Howells, et al., p. 68.

over-capacity problem. In mid-1988 the mandatory quota regime came to an end.

The decade of deep-pocket intervention in the steel industry left its mark on EC trade in steel. To complement, and make effective, its internal production quotas, the EC imposed a comprehensive system of import restrictions. These import restrictions, or quotas, which began in 1978 when internal production quotas were still non-mandatory, are still in effect. They limit import penetration of the EC steel market to about 10 to 12 per cent of consumption. One effect of the quotas was to keep EC steel prices artificially high. Another was to accentuate the problem of excess capacity.

The capacity threat in Europe after 1975 led to a search for export markets. The rise in EC exports of steel since 1975, some of which has found its way to Canada, has often led to charges of "dumping." The fact that EC policies probably contributed to artificially high prices of steel within the EC, made more credible charges that EC exports of steel were often at "dumped" prices. For example, between 1977 and 1987 Canadian steel producers initiated 88 dumping cases involving 27 products from 21 countries, many of them EC Member States. In most instances these cases resulted in the levying of anti-dumping duties.[7]

In addition to "dumping" charges, there were complaints that EC Member State policies unfairly subsidized exports. Between 1977 and 1987, complaints filed

by Canadian steel producers resulted in the initiation of two countervailing duty investigations into subsidized steel exports from two different EC Member States. In both cases the subsidized goods were found to be causing injury to domestic producers, resulting in the levying of countervailing duties.

The current situation in the industry illustrates the considerable success the European Commission has had in making the industry face up to its over-capacity and stop relying on state subsidization. As a result of crisis management, the EC steel industry has shed 50 per cent of its workforce and for the past two years has effectively had no excess capacity in terms of what it can produce. In addition, the EC has agreed to a strict aids code which basically forbids state subsidization. With regard to import controls, these now exist only with regard to Eastern Europe and Brazil. Furthermore, the EC has announced the intention of increasing the tonnage allowed under these restraint agreements by 15 per cent in 1990, and is committed to doing away with all restraint agreements by 1992.

What we have, therefore, is an EC steel industry that is greatly rationalized, has dealt with the massive social problem of laying off half its work force, is subject to strict policing of subsidization, and is very nearly freed of grey measure import restraints. Recourse to anti-dumping and countervail action, however, remains possible. The industry has been given a clear message that it is now on its own and will have to survive based on its ability to compete across the EC and against suppliers from the rest of the world. It is unlikely that the EC will once again intervene to rescue the industry as was the case in the past. Indeed, the fact that it is a less significant employer should result in less political pressures being brought to bear.

2.11 Coal

Closely related to the EC steel industry is the EC coal industry. In fact, the first steps taken toward the creation of a European common market was the establishment, in 1952, of the European Coal and Steel Community (ECSC).[8] The ECSC reflected not only the post-World War II yearning of Europeans to eliminate some of the economic barriers that had done so much political as well as economic damage in this century, but also the close relationship between the coal and steel industries and the process of postwar re-industrialization.

The EC coal industry is centred in West Germany and the U.K., with secondary sources in Greece and Spain. In 1986, West Germany produced 38 per cent of the Community's 230 million tonnes of coal and 65 per cent of its 190 million tonnes of lignite. The U.K. accounted for 46 per cent of Community coal production, while Greece contributed 22 per cent of the lignite. Table 20 provides summary data on EC coal production, consumption and trade. The table indicates coal tonnage with and without inclusion of lignite. Lignite has only a third of the heat value of coal, making it less valued in the two major uses of coal.

The EC coal industry has two major customers. Electricity generating stations represent 65 per cent of the market, while steel industry coking plants account for another 22 per cent. The coal industry accounts for between one-fifth and one-quarter of European energy consumption, with a slow but definite loss in share to natural gas and nuclear power. Thus the EC coal industry depends vitally on two sectors in which government has played a major role: its main market is the nationalized electricity industries, and most of the remainder of its output is directed to the steel industry.

TABLE 20

EC Coal Flows, 1980, 1986
(in millions of tonnes)

	1980	1986
EC production (including lignite)	425.1	420.4
EC consumption (including lignite)	479.7	494.4
Net export volumes (including lignite)	-54.6	-74.0
Employment (X 000)	548.9	420.8
Production (coal only)	260.3	227.9
Consumption (coal only)	330.4	320.3
Net exports	-70.1	-92.4
Destined for electric power stations	194.2	195.6
Destined for coking plants	93.4	77.3

Source: *Panorama of EC Industry 1989*, pp. 1:3, 1:4.

The EC coal industry is itself heavily dependent on state aid. It is the recipient of huge subsidies, sometimes exceeding the world price of coal, but even with these subsidies, the EC's coal industry is unable to meet consumption demand. The high cost of production of many pits, which the subsidies attempt to conceal, reflects their lack of productivity. The slowly increasing dependence of the EC on coal imports (one-third of coal consumption) includes a measure of Canadian coal which began penetrating EC markets in the mid-1970s. By 1987, Canadian exports of coal to the EC amounted to 1 395 000 tonnes -- or about 1.4 per cent of EC coal imports.

The trend is to increased imports of coal even while the overall market for coal in the EC declines in importance. Canadian coal exports to the EC are expected to amount to 2.1 million tonnes in 1989 out of total imports of 98.5 million tonnes. By comparison, the EC imported an estimated 34.7 million tonnes from the United States, 20.9 million tonnes from Australia, and 18.5 million tonnes from South Africa.

Nevertheless, the huge subsidies afforded to the largely government-owned EC coal industry has constituted a major barrier to coal trade with non-EC countries. A glance at the EC's own state aid rules, established in 1986 to moderate Member State assistance, which had mushroomed since the early 1970s, tells the story. The state aid approved by the EC in 1987 ranges from a low of 4.70 ECU (approximately US$ 5.35) a tonne of coal produced in the U.K., to a high of 110.10 ECU (US$ 134) a tonne in Belgium. In the F.R.G., one of the Community's two main suppliers of coal, the average state aid rate was 46.40 ECU (US$ 52.70) a tonne, a sum that exceeded world coal prices. Moreover, the EC-approved state aid is believed to be only the proverbial "tip of the iceberg." Other forms of aid are estimated to raise the F.R.G. total to US$ 100 per tonne. A 1979 EC "Inventory of State Aids" suggests that the level of assistance paid out to EC Member States for coal amounted to 25 000 ECU per employee.[9]

Subsidies are not the only barrier to trade in coal. Government ownership of the industry is reflective of the protective

attitude EC Member State governments have toward their coal industries and the persons they employ. A very important form of protection is afforded by government procurement policies. Since governments own the electrical generating industry and have given large sums of money to their steel industries, they naturally will look toward their own subsidized and typically government-owned coal firms to supply the necessary energy inputs. Government procurement policies inhibit internal as well as extra-EC trade. Thus, for example, France's heavily nuclear power-based electricity industry has little chance of breaking into the West German market where electricity is generated by coal-burning plants using coal from West Germany's highly subsidized pits.

Although the huge subsidies and government procurement policy protections afforded the EC coal industry are unlikely to be eliminated or even significantly reduced in the foreseeable future, the prospects are not totally bleak for increased coal imports into the EC. The fundamental problem of the EC coal industry is that so many of its production sites are marginal at best -- and in 15 per cent of the cases prohibitively expensive. Only 20 per cent of Community production is currently considered competitive in relation to imported coal.[10]

Since the EC's approved state aids policy is premised on improvements in competitiveness and the creation of economically viable coal capacity, it is at least possible, if not probable, that the least competitive pits will be closed in the long run. Closure would provide an opening wedge for increased imports. How much depends, however, on what proportion of the 65 per cent of currently marginally profitable state aid-dependent coal production will become competitive as a result of productivity improvements.

It is worth noting, however, that in some Member States coal suppliers are drastically cutting back on production. Fox example, coal production in Belgium will effectively cease, and production in France will be halved. The Commission has also started to get tough with West Germany on its high level of subsidization, and has similar plans to engage subsidy systems in the United Kingdom and in Spain. The future EC market for coal may very well be affected by such interventions.

2.12 Scrap

Finally, a few words should be given to the recycling of scrap metals. The recovery of scrap and waste metals is an increasingly important internal source of raw materials for EC metal industries. Because the EC has few ore deposits, it has developed a broad-based and sophisticated scrap metal industry with roots in every EC Member State. By the mid-1980s scrap ferrous provided about one-third (31 per cent) of the raw material for EC steel production. At the same time the EC was a net exporter of scrap ferrous.

Recycling of non-ferrous scrap metal is also important. Recovery of aluminum, copper, zinc and lead meets between 25 and 35 per cent of the raw material needs of these important EC non-ferrous metal industries.[11] The EC is a net importer of copper scrap.

The importance of the scrap metal industry can be expected to grow in increasingly environment-conscious Europe. Recycling reduces air pollution effluents and water pollution that are by-products of the smelting of ores and concentrates. In addition, there are major energy-savings when metals are made from recycled rather than virgin materials. These energy savings are estimated at 74 per cent for steel, 95 per cent for aluminum, and 90 per cent for copper production using recycled materials.[12] In turn, lower energy costs further reduce pollution stemming from energy generation based on the burning of fossil fuels.

3. EUROPE 1992 AND THE EUROPEAN MINERALS AND METALS SECTOR

The preceding section described the state of several important industries within the EC minerals and metals sector. In this section we ask what impact the EC's effort to create a Single Market will have on the minerals and metals industries. The short, quick answer is "very little." The longer answer is "it depends."

At the outset, it is important to recognize that virtually none of the over 300 directives associated with the EC's goal of creating a Single Market by the end of 1992 involve the minerals and metals sector of the EC economy. Not even the environmental and health directives relating to lead, nickel and nickel compounds and to the use of asbestos are included in the set of Single Market directives. Does this mean that a Single Market already exists for minerals and metals? Are there currently no impediments to trade in these products which require action by the EC?

Because the EC is a common market, there are, of course, no tariffs on intra-EC trade in minerals and metals. In addition, the essentially homogeneous nature of most minerals and metals sector products, for any given specification, implies that non-tariff, technical barriers to trade in the form of norms, standards, testing and certification will also be relatively unimportant, if not non-existent. As we have seen, however, potential non-tariff barriers to trade exist in the form of what might be broadly termed "state aids."

EC "state aids" take two main forms. First, there are subsidies or grants. Examples include the large subsidies to the EC Member State coal and steel industries, to the aluminum industry in France and recently to some non-ferrous metal industries in Italy. A second type of state aid takes the form of restrictive practices including quotas (steel), government procurement (e.g., "local" coal purchased by government-run electricity boards), and requirements that firms purchase from state-run or granted monopolies (e.g., potash in France).

Broadly speaking, the existence of state aids tends to interfere with the operation of a Single Market for the state-aided commodities. As a result, a Single Market does not yet exist throughout the EC minerals and metals sector. But there is as yet no indication that the EC will give anything like the attention to implicit trade barriers in the minerals and metals sector, created by subsidies and other state aids, that it has given to the more explicit technical barriers that have inhibited trade in such industries as telecommunications equipment and computer products and services.

The existence of industrial subsidies constitutes a barrier to trade both within the EC and between the EC and its trading partners. Production subsidies or grants to cover the cost of capital equipment act as either export- or import-competing subsidies. Such subsidies have long been recognized as trade distorting. When the subsidies are explicitly employed as a means of stimulating exports they run afoul of the multilateral trade agreement rules of GATT. In the EC case, however, the subsidies are designed to enhance the ability of "local" industries to serve the "home" (EC) market. In this sense the subsidies are better described as import-competing -- and thus are not in apparent violation of GATT codes. Nevertheless, the subsidies constitute a barrier to trade.

In its quest to create a Single Market, the EC does not seem to have paid much, if any, attention to the subsidy issue. Undoubtedly, "political reality" is a major explanation for this apparent policy lapse. But, whatever the political realities, it is important to recognize a potential inconsistency in the EC approach to the Single Market. The inconsistency is most apparent when one considers the concern

evinced in some EC quarters about varying rates of value-added tax (VAT). Varying levels of VAT are viewed as potentially trade distorting. The reason is that the VAT can be viewed as a negative subsidy, with a potential impact on intra-EC as well as extra-EC trade. What can be said of VAT, however, in principle, can also be said of some kinds of industrial subsidies.

EC policy has not totally ignored the problem of state aids. It is perhaps more than a coincidence that mandatory production quotas for steel were eliminated in 1988. Moreover, although the EC-approved production subsidies for coal are huge, some effort was made by the European Commission to harmonize subsidy levels, given the regional variation in underlying production costs. Moreover, the EC is not happy with a recent Italian initiative to contribute 157 million ECU toward the revitalization of that country's non-ferrous mining industry.

There is, then, less actual inconsistency in recent EC policies than may seem apparent. At bottom, Europe 1992 is more about harmonization than it is about through-and-through deregulation. Just as the EC has attempted to eliminate internal (to the EC) technical barriers to trade by harmonization, it may be slowly doing the same in the area of subsidies. To this extent not only are the subsidy and technical barrier policies potentially consistent, but their effect on intra-EC trade is marginally liberalizing. Nevertheless, just as the elimination of technical barriers to trade within the EC does not necessarily eliminate all barriers to extra-EC trade, the harmonization of subsidies within the EC remains a potentially important barrier to extra-EC trade in state-aided industries.

There is another EC initiative that should be mentioned. Although natural resource management is largely in the hands of EC Member State governments, the Commission of the European Community has attempted to sketch the elements of an EC mining policy. In its recently released "Memorandum on the Mining Industry of the Community," the EC identified several problem areas. These essentially reduce to the following: a lack of requisite geological knowledge; cumbersome exploration licensing and mining authorization procedures; inadequate tax incentives; and inadequate research and development (R&D). The memorandum concludes that while there is no need for sector-specific policies or programs, there is a need to give greater support to R&D and to the training of mining industry personnel, particularly geologists and mining engineers.[13] The memorandum also concludes that mining activities should be encouraged within the EC, but not to the point where internationally uncompetitive operations are allowed to continue by virtue of state subsidies.

Indirectly, Europe 1992 may have an effect on the structure of the European minerals and metals sector. Although few directives apply directly to the minerals and metals sector, the Europe 1992 concept contains a loud message: rationalize to become more efficient and internationally competitive. As a result, many observers expect that Europe 1992 will prompt a mini-boom in cross-state mergers and alliances, an expectation that is already becoming a reality in some sectors such as telecommunications equipment and informatic goods and services.

It is unlikely that the minerals and metals sector will escape some degree of transformation via mergers or joint ventures and other alliances. To the extent these contribute to the rationalization of the EC minerals and metals sector, without any change in the level of external trade barriers, Canadian firms wishing to sell semi-processed and semi-fabricated products in the EC will find penetration of the European market even more difficult than at present, without some form of concrete EC presence. (The issue of "presence" is discussed below.)

Finally, there is the problematic relationship between Europe 1992 and East European *perestroika*. On balance, a Single EC Market poses a potential opportunity for the Eastern European countries as they move towards more market-oriented economies. The opportunity is to use their potential comparative advantage vis-à-vis the EC in resources, particularly those of the Soviet Union, to gain barrier-free entry to the EC for raw materials and semi-processed goods as a means of paying for more highly fabricated and high-tech EC exports. Doing so, however, will require that they become far more efficient in production than is now the case. Nevertheless, it is at least possible that the most important long-run impact of Europe 1992 on Canada and other non-European countries is the potential realignment of Western and Eastern European trade patterns it may induce. We return briefly to the impact of *perestroika* on the Canadian minerals and metals sector below.

In sum, EC policy toward the minerals and metals industries is neither as well-developed nor as coherent as the Europe 1992 directives applicable to the manufacturing and service sectors of the EC economy. Ironically, Europe is net import dependent on minerals, and might be more so in the absence of state aids. Because Canada is one of the world's leading resource-producing nations, and arguably the most important exporter, EC minerals and metals policies, and their essentially protectionist nature, have a particular interest to this nation. It is important, then, to examine the health and competitiveness of the Canadian mining- and metal-producing sector and the prospects for further penetration of the large EC market.

4. EUROPE 1992: IMPLICATIONS FOR THE CANADIAN MINERALS AND METALS SECTOR

As stated earlier, Europe 1992, viewed as a set of directives designed to create a Single EC Market, will have little direct impact on the minerals and metals sector, domestic or foreign. Few, if any, directives apply directly, and those that do affect the minerals and metals sector relate to environmental and/or health protection. Although these may raise trade barriers, observations to date are that the Commission has responded to increased awareness of environmental and health risks in a responsible and measured fashion, not out of line with what we in Canada are doing. The Commission has tended to be receptive to the views of industry and has taken the "controlled use approach" whereby the continued use of a hazardous product is permitted so long as reasonable precautions are taken.

There is, however, an indirect effect of Europe 1992 that should have an important effect on the minerals and metals sector. Europe 1992 is predicted to raise EC gross national product (GNP) by 4.5 per cent -- or about one-quarter of a trillion dollars. If this prediction is correct the increase in final output will create a derived demand for raw material and semi-fabricated inputs. Thus the issue for any important minerals and metals producer, such as Canada, is whether it is and will remain sufficiently competitive to take advantage of the increase in demand for raw material and processed inputs that Europe 1992 is likely to engender.

To gain some perspective it is useful to assess the relative importance of the EC to total Canadian trade in minerals and in non-ferrous metals. Table 21 provides a useful summary. The EC absorbs a large proportion of Canadian exports of refined and smelter copper (blister) and nicokel, zinc and lead ores or concentrates. Clearly, economic developments in the EC are of importance to key sectors of the Canadian minerals industry.

Is the Canadian minerals and metals sector well-positioned to remain an important source of EC minerals and metals inputs? Again, some perspective is important. Prior to the early 1970s, Canadian minerals and metals firms were often key -- in some cases, such as nickel production, dominant -- world players. However, after the pre-OPEC run-up of minerals and metals prices and the post-OPEC economic downturn and stagnation, the Canadian mining industry fell into the doldrums. In particular, Canadian firms lost market share to newly created, often state-owned firms in the newly industrializing countries. In the late 1970s investment in Canadian mining plummeted, reflecting investor opinion that the sector was no longer a source of healthy returns on investment.

The mining industry received a further blow from the deep world recession of the early 1980s. Minerals and metals prices, which had rebounded somewhat in the late 1970s plummeted again. The plight of the mining sector appeared worse than ever. For many mining firms it was difficult to attract top-flight management.

In retrospect, however, the early 1980s were also a turning point for the Canadian mining and smelting industries. In response to the adverse shocks of the 1970s and early 1980s, many firms took stock of their situation. Often they found top-heavy management, high average costs, and increasingly outdated equipment and technology. Thus, the early 1980s witnessed a combination of layoffs and heavy investments in new, state-of-the-art equipment and technology. By the mid-1980s the industry began to find it easier to attract new top-flight management. In short, Canadian mining firms "restructured." The restructuring was soon reflected in a marked rise in productivity, averaging 9 per cent annually since the early 1980s.[14] As a result, Canadian mining and smelting firms had positioned themselves to become major competitors on world markets when demand again began to rise in the mid- and late-1980s.

TABLE 21

Canadian Exports to EC Member States, 1987
(in tonnes)

	Aluminum	Copper Concentrates	Smelted and Refined Copper	Nickel	Matte[a]	Zinc Concentrates	Slab Zinc	Lead Concentrates	Refined Lead	Molybdenum
Belgium	7 088		4 102			259 161		32 283[b]		4 484
Denmark										
France			6 167			47 747				551
F.R.G.	861		7 759			35 477		20 455	4 009	530
Greece										
Ireland										
Italy			9 528			47 822				1 882
Netherlands	10 952		8 193			1 843			495	
Portugal	5 358		1 049							
Spain		12 524								
U.K.	1 302		39 381	25 761		20 333	1 001	3 607	19 423	681
Total	25 561	12 524	76 179	25 761		392 050	1 001	52 738	23 927	8 128
Total Canadian Exports	1 171 844	381 123	288 811	56 560		613 180	441 220	68 399	100 206	14 253

Source: *World Metal Statistics*, various tables.

[a] In addition 24 050 tonnes of refined nickel were shipped by Canada to the EC in 1987.
[b] For 1988.

They are also in a good position to take advantage of whatever opportunities Europe 1992 has to offer.

4.1 The Canadian Non-Ferrous Minerals and Metals Sector

The Canadian non-ferrous minerals sector is highly concentrated with a few large, export-oriented firms accounting for the lion's share (80 per cent or more) of mining output and smelting-refining activity in Canada. Because the markets for most minerals and metals are worldwide, having a large market share in one country does not convey much, if any, form of market power. In fact, the main challenge facing large mining and metal firms is to remain competitive on world markets. To give some of the flavour of how the Canadian non-ferrous mining and metals firms are positioned to meet competition in the 1990s and take advantage of whatever opportunities Europe 1992 affords, singled out below are the aluminum, copper, nickel and zinc-lead industries.

a) Aluminum

There are three major aluminum firms in Canada (see Table 6), with eight smelters, all but one of which are located in Quebec. Alcan is by far the dominant firm and a major player on world markets. Almost 11 per cent of the Western world's primary aluminum capacity is located in Canada -- a testament to the province of Quebec's relatively cheap hydro-generated electricity (see Table 22). Because energy is the second most important input and the most important variable cost associated with aluminum production, Canada's share of aluminum capacity is likely to rise, as new smelters, lured by low electricity rates, come on stream.

Although Canada is the world's largest exporter of aluminum, only 8 per cent of the exports went to the EC in 1988. Europe as a whole is virtually self-sufficient, with consumption only slightly in excess of the production of primary plus secondary aluminum. Norway, with cheap hydro-electric energy supplies a large portion of the deficits that exist within the EC. Thus the majority of Alcan's and Canadian Reynolds' exports of aluminum finds its way into these companies' own fabricating plants in the U.S. and elsewhere. Alcan sales of primary aluminum products in the EC come from subsidiaries located in the U.K., fed by its alumina capacity in Ireland. In turn, Alcan's primary aluminum capacity in the U.K. feeds its network of EC-located semi-fabricating and fabricating facilities located in France, Italy, West Germany and the U.K.

Although the Canadian aluminum industry is competitive on a world scale, there is little prospect of a breakthrough in Europe via exports. State ownership, increasingly efficient production capacity, tariffs and policies aimed at self-sufficiency, imply that Europe, even after 1992, holds few prospects for Canadian aluminum firms that do not already have subsidiaries in Europe. Moreover, the increase in aluminum capacity in those NICs with both large amounts of bauxite and low energy costs, such as Brazil, Venezuela and Indonesia, has led some Canadian aluminum firms seeking growth to go beyond downstream integration into semis. For example, Alcan is venturing into new fields such as advanced materials and into new, aluminum-related products. In sum, with or without Europe 1992, Canada's aluminum industry will remain both viable and relatively healthy.

b) Copper

The Canadian copper smelting and refining industry consists of four world-scale firms, all of which are vertically integrated backward into mining to some degree. While Inco and Falconbridge have been self-sufficient in mine production, Noranda and Hudson Bay Mining and Smelting, faced with diminishing ore reserves, have had to increasingly rely on purchases of concentrates. With copper mine production relatively stagnant in Canada, these

TABLE 22

Western World Primary Aluminum Capacity, 1986

Area	Number of Smelters	Capacity (millions of tonnes)	Percentage of World Capacity
Canada	8	1.46	10.7
U.S.	25	3.84	28.2
Western Europe	44	3.59	26.4
Asia	1	1.26	9.3
Africa	4	0.63	4.6
South America	13	1.55	11.4
Oceania	6	1.28	9.4
TOTAL	115	13.61	100.0

Source: ISTC, *Aluminum Smelting*, Industry Profile 3010, p. 2.

TABLE 23

Source and Destination of Canadian Imports and Exports of Copper (percentage of total value of exports)

	EC	U.S.	Asia	Others	Total
Imports					
1982	1.9	32.6	-	65.5	100.0
1984	2.0	20.4	-	77.6	100.0
1986	0.3	42.5	-	57.2	100.0
Exports					
1982	56.9	37.9	-	0.2	100.0
1984	28.3	53.7	-	13.8	100.0
1986	32.2	63.5	-	1.0	100.0

Source: ISTC, *Copper Smelting and Refining*, Industry Profile 3012, p. 7.

purchases often take the form of imports.

Canada is the third largest exporter of refined copper after Chile and Zambia, which account for 35 and 24 per cent of world exports, respectively. Canada exports nearly 60 per cent of its refined copper production, accounting for 12 per cent of world exports. Historically the EC has been an important destination for Canadian copper exports, as Table 23 shows.

Canadian copper operations, in addition to having achieved economies of scale, employ state-of-the-art technology. As a result, Canadian copper producers are sufficiently efficient to be highly competitive on world markets. Although Canadian copper production costs are not as low as they are in Chile, where rich supplies of copper ores give that nation a comparative advantage, it is estimated that Canadian costs are substantially lower than those in Europe.[15] Neither Canada nor the EC has tariffs or other trade barriers restricting trade in primary forms of copper metal. However, both countries levy tariffs on copper semis, which are unlikely to change as a result of Europe 1992. Nevertheless, so far as primary copper metal exports are concerned, there is little, except for transportation costs, to prevent Canada from benefiting from a Europe 1992-induced increase in the demand for copper.

c) Nickel

The Canadian nickel industry has consisted of three firms. Two of these, Inco and Falconbridge, mine the nickel used in their smelters. The third, Sherritt Gordon, relies on outside sources for its supply of nickel concentrates. The two largest Canadian firms, Inco and Falconbridge, account for 34 and 13 per cent of the Western world's production of nickel, respectively. All three firms are majority Canadian owned although the joint takeover of Falconbridge by Noranda and its partner the Swedish firm, Trelleborg, makes it partially foreign owned.

Nickel is principally recovered from two types of ores: sulphide and laterite. Sulphide ores have historically been recovered by labour-intensive underground methods, laterite by open-cut, mechanical methods. Canadian nickel is produced from sulphide ores. In the 1970s, technological change led to a large expansion in the share of nickel produced from laterite deposits, chiefly in NICs and typically through state-owned companies. As a result, Inco's dominant share of Western world production and exports of nickel fell by almost half to its current 35 per cent share.

But the advantages of laterite nickel are limited. In recent years, improved techniques in sulphide mining, including a high degree of mechanization, have reduced mining costs. In addition, sulphide ores include valuable by-products in the form of copper, cobalt and precious metals that can be recovered in the processing of nickel ores. Moreover, nickel smelted from sulphide ores uses much less electricity than does that from laterite ores. As a result, it is estimated that nickel production costs using laterite ores are from 20 to 50 per cent higher than with sulphide ores. Thus the sulphide ore-based Canadian nickel companies are among the lowest cost producers in the Western world.

Canada exports about 95 per cent of its nickel production. Canadian nickel is exported as refined nickel, nickel-copper matte and nickel-oxide sinter. Of total exports, 55 per cent is refined nickel destined chiefly for the U.S. and the EC. Another 30 per cent is exported in the form of nickel-copper matte to refineries in Norway and the U.K., and ultimately into many EC Member States in metal form. Overall, about one-third of the roughly $1 billion in Canadian nickel exports goes directly to the EC (see Table 24).

TABLE 24

Source and Destination of Canadian Imports and Exports of Nickel (percentage of total value of exports)

	EC	U.S.	Asia	Other	Total
Imports					
1982	3	31	-	66	100
1984	3	27	-	70	100
1986	4	37	-	59	100
Exports					
1982	34	25	4	37	100
1984	36	26	14	24	100
1986	32	37	0	31	100

Source: ISTC, *Nickel Smelting and Refining*, Industry Profile 3035, p. 7.

Currently, the prospects of the nickel industry are bright. Anything that contributes to European economic growth, as Europe 1992 is supposed to do, should further increase the demand for nickel. Canadian firms are sufficiently competitive to share in that growth. However, a few clouds are on the horizon. Although there are currently few substitutes for nickel, rapid developments in ceramics and plastics could affect nickel markets in the longer run. More immediate concerns are raised by environmental and health protection regulations. In Canada, new sulphur dioxide controls are likely to require substantial capital expenditures and raise the operating costs of smelting operations.

Potentially more ominous is the question of the role of certain nickel compounds as carcinogenic. Recently, the International Agency for Research on Cancer conducted a special working group and concluded that various nickel compounds can be carcinogenic in humans, due to the sensitivity of certain individuals to nickel. Denmark has banned the importation of certain nickel-plated products that are in direct and permanent contact with the skin. While the Danish action by itself has little effect on the nickel market, the impact would be greatly magnified if it set a precedent for other EC Member States or became the basis of an EC directive. Much the same story applies to other important Canadian mineral exports to the EC, including lead and cadmium, which are also believed to have carcinogenic properties.

d) Zinc and Lead

Canada is the world's largest producer of zinc and the third or fourth largest producer of lead. The Canadian zinc and lead industries are headed by two world-scale firms, Cominco and Noranda Minerals, with a few smaller firms, such as Hudson Bay Mining and Smelting, and Curragh Resources playing a less important but nevertheless significant role. Although Cominco jointly owns a mining subsidiary in Spain and is involved in exploration with a West German firm, there are no Canadian-owned smelters in the EC; Canadian zinc-lead producers have been content to export ores and concentrates from their Canadian mines to be smelted and refined by EC-based firms.

Canada is a world export leader in both zinc and lead ores, and refined metals. The EC is an important market for these Canadian exports, as Table 25 shows. The EC is a considerably smaller market for Canada's large exports of zinc slabs and refined lead, because of tariffs, a reflection of Europe's desire to be largely self-sufficient in metal production despite its dependence on mineral imports. The Canadian zinc and lead industries stand to benefit if the predicted Europe 1992-induced economic expansion materializes.

4.2 The Canadian Iron and Steel Industry

The Canadian iron and steel industry is a success story. Although there is little prospect that much, if any, Canadian steel will find its way into the highly protected EC steel market, this failure cannot be attributed to a lack of Canadian steel industry competitiveness. As described earlier, the EC is highly protective of the steel industries of each of its Member States, even where they are efficient and effective exporters.

Beginning in the 1950s, when it is estimated that all Canadian steel-making capacity was of sub-optimal scale, the industry began to specialize, modernize and employ state-of-the-art technology in optimally scaled steel-making plants. The early adoption of the basic oxygen process and the recent move to continuous casting have made the Canadian steel industry

TABLE 25

Canadian Production and Exports of Zinc and Lead Ores and Metals, 1988 (in thousands of tonnes)

	Zinc		Lead	
	Ores and Concentrates	Slabs	Ores and Concentrates	Refined Lead
Production	1 347.4	703.9	366.6	268.1
Exports (total)	774.9	539.7	195.9	186.7
To:				
EC	452.1	26.5	64.6	44.6
Belgium	299.3	0.1	32.3	
France	41.4	0.4	-	0.1
F.R.G.	61.7	0.1	30.2	
Italy	33.4	-		
Netherlands	9.8	-	4.6	
U.K.	6.5	25.9	2.1	39.9
U.S.	33.0	407.1	4.3	107.0
Japan	102.3	-	56.8	-
Other countries	187.5	106.1	70.2	35.1

Source: *World Metal Statistics*, pp. 79, 115.

highly efficient. It is widely recognized that the performance of the Canadian steel industry has outshone that of its sluggish counterpart in the U.S.

The success of the Canadian steel industry should not be measured solely in terms of production levels. Worldwide steel consumption has not grown in the last decade, while steel capacity in NICs such as Brazil, Korea and Mexico has doubled during the same period. The stagnation of the world market for steel, which began in the 1970s, was mirrored in domestic Canadian rolled steel consumption, which in 1986 was still slightly below the 1974 peak.

Prior to 1987, peak rolled Canadian steel production of 12 295 million tonnes was reached in 1980. In 1986, rolled steel production was still 700 000 tonnes below the 1980 figure. However, in 1987 rolled steel production jumped to 12 749 million tonnes and continued its climb in 1988, reaching 13 262 million tonnes. At the same time rolled steel consumption rose even more rapidly.

While domestic demand for steel stagnated in the early 1980s, net exports (exports minus imports) soared. Canada became a net exporter of steel in the mid-1970s. Between 1980 and 1986 net exports of Canadian rolled steel almost doubled, accounting by 1986 for about 25 per cent of total rolled steel production. Even though imports of rolled steel products rose faster than exports of the same in 1987 and 1988, so that in 1988 Canada was a net importer of rolled steel products, the situation was clearly an anomaly. It was the result of the industry operating at capacity and a shut-down of four blast furnaces during 1988 necessitating a large volume of imports, much of it originating in the EC, by the producers themselves. In 1989, Canada was once again a net exporter of rolled steel products. Most of Canada's steel exports are destined for the large U.S. market, as Table 26 indicates.

TABLE 26

Source and Destination of Canadian Imports and Exports of Primary Iron and Steel (percentage of total value of exports)

	EC	U.S.	Japan	Others	Total
Imports					
1982	28	46	12	14	100
1984	37	39	9	15	100
1986	38	34	10	18	100
Exports					
1982	14	56	1	29	100
1984	4	87	1	8	100
1986	6	85	0	9	100

Source: ISTC, *Primary Iron and Steel Industry*, Industry Profile 3001, p. 7.

The vulnerability of the U.S. steel market to Canadian steel exports is attributable to the ability of the latter to remain technologically ahead of the former.[16] While much of Canadian industry has been characterized by technological followership, the Canadian steel industry has been a leader in both research and development and in the adoption of new techniques such as continuous casting and the use of computer control in production facilities. Among the Canadian steel industry success stories is the development of its mini-mill technology.

The primary iron and steel industry consists of two classes of producers. There are the large integrated mills that consume iron ore and produce a wide range of products and there are smaller electric furnace, or mini-mills, which consume scrap and produce a limited range of products. The two major, privately owned Canadian steel firms, Stelco and Dofasco (which acquired the third largest firm, Algoma, in 1988), are integrated producers. Among the firms operating market and/or mini-mills are IPSCO, Co-Steel and Ivaco along with the two government-owned firms of Sidbec and SYSCO. SYSCO was formerly an integrated producer but they have recently closed their coke ovens and blast furnaces.

Even though Canada has been a leader in market mini-mill electric furnace technology, fed by relatively cheap hydro-electricity, most Canadian steel continues to be produced by integrated steel mills using the basic oxygen process. In contrast, south of the border production by major integrated mills has shrunk to less than 50 per cent of U.S. production, as mini-mills have emerged as a highly profitable segment of the industry. Significantly, four of the most successful mini-mills operating in the United States today are owned or controlled by two Canadian steel firms, Co-Steel International and Ivaco.[17]

The successes of the Canadian steel industry make it a potential but not an actual competitor in the EC. Community policies, dating from the creation of the ECSC in 1952, have severely limited the ability of even the most efficient extra-EC firms, to sell in Europe. However, if Europe 1992 goes beyond harmonization to an elimination of the subsidies and import quotas which protect the EC steel industry from extra-EC competition, the Canadian steel industry may begin to face a changing market.

5. OPPORTUNITIES, RISKS AND STRATEGIES

The preceding sections sketched two basic pictures. One was of an EC minerals-dependent but overall metal self-sufficient sector. The other was of a highly efficient, export-oriented Canadian minerals and metals sector. The issue bridging these two pictures is the impact of Europe 1992 -- the set of directives and policies designed to create a Single Market within the European Community -- on Canada's minerals and metals sector.

Addressing the impact of Europe 1992 is more difficult than it seems. We have seen that little or nothing of Europe 1992 bears directly on the minerals and metals sector. The main exception is the relaxation of border controls and related administrative costs. Most of the effects of a Europe 1992 on the minerals and metals sector are indirect. These include (a) the effect on minerals and metals demand of a Europe 1992-induced rise in EC output; (b) the likelihood that the spread of a free market philosophy, which underlies much of Europe 1992, will strengthen the role of private enterprise and the quality of management in the EC minerals and metals sector, where, to date, various forms of "state-aid" currently provide varying degrees of protection; and (c) the harmonization of Member State health and environmental legislation, which could affect the demand for various minerals, including nickel, lead, cadmium, and asbestos.

Given the limited degree of direct application of Europe 1992 to the EC minerals and metals sector, it is not surprising that the Canadian minerals and metals sector does not view developments in Europe as a dramatic break with the past. Rather, Europe 1992 is viewed as part of a process of internal trade liberalization similar to the Canada-U.S. Free Trade Agreement (FTA), which will put pressure on firms to rationalize their activities.

Canadian firms selling ores and concentrates to the EC will find business as usual -- although perhaps a bit more brisk than otherwise. Those wishing to sell metals -- especially wrought metals -- will still face external tariffs.[18] The Canadian steel industry will continue to find the EC market difficult until such time as the impact of reductions in the level of "state aids" take effect. To the extent that Europe 1992 stimulates rationalization in the European metals sector, it may make some EC metals firms stronger competitors for Canadian firms in non-EC markets.

In short, for Canadian minerals and metals firms, whose link to the EC is chiefly via arm's-length exports, trade with the EC is unlikely to be either enhanced or suppressed by the specific provisions of Europe 1992, although it will be increased if Europe 1992 leads to economic expansion. Beyond this, increased trading opportunities will await the outcome of current and future GATT negotiations on metals tariffs, a theme to which we return below.

There is an important exception to the general picture. Firms with an established network of facilities, production or sales within the EC will find that the creation of the Single Market makes a difference. Although the homogeneous nature of most unwrought metal products allows them to move easily in the EC environment, border controls, government procurement policies and state aids have hampered the development of a truly free internal EC market for minerals and metals. Some of these impediments can also interfere with free trade in wrought or fabricated metals. Europe 1992, by reducing these impediments, should increase the freedom of intra-EC trade in metals and fabricated products.

The preceding statements provide a general picture of the prospects created by Europe 1992. It is possible, however, to be somewhat more specific about the way in

which Europe 1992 may change the trading-investment relations of Canadian mining and metal firms. Five issues are briefly discussed below: (1) presence; (2) global restructuring; (3) *perestroika*; (4) the impact of environmental and health concerns; and (5) new materials.

5.1 Presence

One of the key issues raised by Europe 1992 is how the development of a Single Market will affect non-EC minerals and metals firms that lack an EC presence. For firms whose main business is selling ores and concentrates, Europe 1992 should not pose any problems. If anything, the expected increase in EC production, stimulated by Europe 1992, will increase the demand for raw materials. However, Europe 1992 has raised in some minds the spectre of a "Fortress Europe." That spectre is one in which non-EC mining and metal firms might find it difficult to take advantage of Europe's markets for refined and fabricated metals in which they compete with EC firms, unless they already have a production presence in the EC.

While the Fortress Europe "scare" is receding and is now widely recognized as a misreading of Community intentions, there are undoubtedly marketing and reputation advantages gained from having facilities located somewhere in the EC, for firms wishing to sell large amounts of wrought and fabricated metals. Moreover, if Europe 1992 achieves its goal of a Single Market, a presence in 1 Member State gives unquestioned access to the other 11. Thus the importance of an EC presence -- to the extent it is important at all -- is probably related to the degree to which a mining and metal firm is vertically integrated downstream. For firms heavily involved in fabrication, such as Alcan, an EC presence is important.

While it is difficult to assess the probable impact of Europe 1992 on non-EC firms wishing to increase metal sales to the EC, it is instructive to note the role played in the EC by Canada's leading non-ferrous metal producers. Table 27 shows that Canada's leading, world-scale, non-ferrous metal producers have varying degrees of production presence in the EC.

Although an EC presence is not essential in order to sell unwrought metal in the EC (Noranda has long sold copper metal in the copper-short EC and Cominco has made some arm's-length sales of slab zinc and lead), Alcan and Inco recognize the advantage of having facilities located in the EC. An important determinant of whether a non-ferrous metal firm will wish to have production facilities located in the EC is the degree to which it wishes to be vertically integrated downstream. The firms in Table 27 illustrate this point.

At one end is Alcan whose worldwide facilities make it an integrated firm from mining to aluminum fabrication. Because of the importance of its downstream operations, and its need to overcome EC Member State support for their own aluminum industries, Alcan's European market depends heavily on its EC presence. Similarly, Inco, the world's leading nickel producer, is vertically integrated from mining through refining. Inco feeds its refinery in Wales with smelted product from Sudbury. In turn, the Welsh smelter supplies refined product to rolling mills in England.

At the other end of the table are Cominco and Noranda, which supply copper, zinc and lead to the EC. Neither have smelting facilities in the EC. In the case of zinc and lead almost all sales to the EC are in ore and concentrate form, with Cominco the chief Canadian supplier. Although Cominco's Canadian operations are integrated from the mining to the smelting-refining level, Cominco finds it profitable to sell large amounts of zinc and lead ores and concentrates to custom smelters in the EC. It is profitable to do so because the advantages of vertical integration, in terms of additional value added, are not nearly as great for zinc and lead as for the other metals listed in Table 27. At the same time Cominco

TABLE 27

Canadian Mining and Metal Production Facilities in EC

Metal	Firm	Nature of Facilities	Location
Alumina and Aluminum	Alcan	mines (bauxite)	France
		5 smelters	U.K.(3), Ireland[a], Spain[b]
		fabrication facilities	France, Italy, West Germany, U.K.
		sales office	
Copper	Noranda Trelleborg	smelter-refinery[c]	Norway[d]
		sales office	Netherlands
		dealer[g]	U.K.
Nickel	Inco	smelter/refinery	Wales
		refinery-rolling mill	U.K.
		sales office	Belgium, Italy, France
	Sherritt Gordon	sales office	Portugal
Zinc/Lead	Cominco[e]	mine[f]	Spain
		sales office	Belgium, France, Netherlands, U.K.
	Noranda	dealer[g]	U.K.

Source: Interdepartmental Working Group Report, *Europe 1992 Canada-EC Minerals and Metals Trade and Impact of Europe 1992*, September 1989.

a Joint venture (alumina refinery).

b Alcan has 24 per cent interest in the state-owned company Industria Espanola del Alumino.

c Nickel-copper.

d Although Norway is a member of EFTA, not the EC, this facility plays an important role in supplying the EC with nickel. The smelter/refinery belongs to Falconbridge, control over which was gained by Noranda Trelleborg in a recent takeover.

e Cominco recently sold its share in an Irish zinc mine. Cominco is also involved in a mining exploration joint venture with a West German firm.

f Cominco has a joint venture in Cominco Espana S.A. (Exminesa) a lead mine which turns the ores it mines into concentrates.

g A dealer on the London metal exchange.

directs most of the metal product output of its Trail, B.C., smelter to the U.S., where zinc and lead smelting has virtually ceased due to environmental regulation, and to the Far East. Nevertheless, Cominco also sells some unwrought metal to the EC, as well.

In some contrast to either the Alcan, Inco or Cominco models are the leading Canadian steel producers, Stelco and Dofasco. While vertically integrated, the integration typically does not extend very far downstream. With exceptions, there is little or no integration into fabrication. The exceptions include Stelco's 50/50 joint partnership with Jannock Steel Fabricating Company which owns and operates several businesses which manufacture and market sheet steel buildings in Canada and the U.S. Stelco has also purchased CHT Steel Company, a heat treater of steel located in Ontario. Dofasco, through its ownership in Algoma, is a 50/50 partner with Jannock Ltd. in Ferum Inc., which sells a wide variety of steel tubing products.

Like steel firms elsewhere, Stelco and Dofasco concentrate their steel-making facilities domestically, selling at arm's-length into foreign markets. It is the relatively non-integrated mini-mills that are far more footloose. As mentioned, Ivaco and Co-Steel have subsidiaries in the U.S. Co-Steel also has 70 per cent ownership in Sheerness, a U.K. mini-mill steel firm, and is negotiating to buy the remaining shares. Recently Ivaco is reported to be planning to move its nail-making plant from Florida to Poland. Since mini-mills, and the continuous casting process many of them have adopted, tend to move the steel-making process closer to steel's downstream market, we can expect a tendency for steel firms operating mini-mills to give greater attention to "globalizing" their operations. In that event, Europe 1992 could create opportunities for Canadian (mini-mill) steel firms prepared to invest in an EC presence.

If an EC presence is important for some segment of the metals industry, it is the downstream, fabrication segment. Not only are external tariffs generally higher on fabricated product than an unwrought product, but the market-orientation of the fabrication business may make it essential for the supplier to locate near its customers. There are exceptions of course -- the chief exception being a metal fabricator whose product is either unique or whose manufacture does not take place in all parts of the world.

An example of an export-oriented fabricator is Tri-Steel, located in Montreal, which makes steel transmission towers. Tri-Steel exports 53 per cent of its output, only a third of which is destined for the U.S. But Tri-Steel does not sell into the EC. The reasons are clear. The business of steel transmission tower construction is highly developed in the EC, particularly in Italy, where the world's largest transmission tower firm SAE (recently purchased by the international conglomerate Asea Brown-Boveri) is located. Moreover, tower design requirements in France and Germany make it difficult for outsiders to penetrate these national markets. Finally, metal-making and fabricating expertise is so deep, apprenticeship programs so widespread, and technology on or so close to the frontier in the EC, it is difficult for even superior non-EC firms to penetrate the EC market -- at least via exports. Whatever advantage Canadian firms have is linked to proximity to the natural resource -- an advantage that would be lost to production facilities abroad.

There are some factors, however, which may inhibit a foreign presence. Many fabricators are relatively small, non-integrated firms. This is particularly so in the steel industry, where the large integrated steel producers are, to only a limited degree, integrated downstream beyond the manufacture of basic products such as tubes, sheet, beams, rails, etc. In fact, many steel fabricators have enjoyed success when relatively small -- Dominion Bridge, Canada Bridge, and Canron being

examples. But, where presence in a foreign market is important if a firm wishes to make sales, smallness can sometimes pose problems. It is difficult, if not impossible, for one-man firms to make quick marketing decisions when operations are decentralized. Decentralizing decision-making may not be an option in many cases because the persons most capable of quickly making the right marketing decisions are already in the business.

The alternative to establishing a subsidiary is to enter into an alliance, partnership or joint venture. Many small industrial firms are reported to be "going global" in this manner.[19] It is significant that across many industries small as well as large firms find it desirable to expand their markets by linking up with foreign firms in some form of venture rather than relying solely on arm's-length exports. Foreign sales require "local" knowledge and contacts. We have here an example of the fact that there are two types of essential knowledge: technological and "on-the-spot." Both are necessary for business success.

5.2 Global Restructuring

As the EC moves toward its rendezvous with 1992, there is a restructuring or reorganization of the minerals and metals sector taking place that goes beyond cost-cutting rationalizations. This restructuring includes organizational changes in the form of mergers and alliances that are transforming national mining firms into global giants. The reorganizations currently taking place probably reflect, in part, the success the mining industry had in the early 1980s in cutting costs and rationalizing its activities. Canadian mineral and metal sector firms, in particular, entered the late 1980s in a globally competitive position.

Europe 1992 for its part sets the stage for intra-EC reorganizations. Perhaps the most important impact of Europe 1992 on the European minerals and metals sector is that it further reduces the political barriers to rationalization and the bureaucratic barriers to doing business on an EC-wide basis. Thus we may anticipate that some EC metals firms will become larger, more globally competitive, and capable of invading non-EC markets.

We may also anticipate that those EC firms which are vertically integrated backward into mining will consider taking advantage of developments in the U.S.S.R. and Eastern Europe to diversify their sources of raw material supply by making investments in, and entering into alliances with, mining operations, particularly the Soviet Union. If making such investments turns out to be practical, they will provide additional sources of supply to EC metal producers, which for the last decade or two have sought greater diversity in raw materials input supply.

The developments taking place in the EC and in Eastern Europe will hasten organizational changes already taking place in Canadian mining and metal sector firms. Canadian firms are taking on a more organizationally global character. Alcan has been a global firm for many years. Now Cominco and Noranda have become involved in what might best be termed global resource alliances. When CP sold Cominco in 1986, a controlling block of shares was purchased by a consortia made up of the Canadian-based firm Teck, the West German resource conglomerate Metallgesellschaft, and the Australian mining firm, MIN. Now Noranda has taken the important step of becoming involved with the Swedish resource conglomerate, Trelleborg, through their joint purchase of Falconbridge.[20] While it is too early to be certain, there is at least a hint that the leading mining firms of the future will not only sell globally, but, perhaps as a response to currency fluctuations, become organizationally global, with worldwide production facilities linked via one or another form of alliance. Europe 1992 will contribute to this process to the extent it knocks down national barriers in

the world's largest mineral-consuming market.

5.3 *Perestroika*

Parallelling the seven year run-up to Europe 1992 are dramatic events in Eastern Europe, including the Soviet Union. While the impetus for Europe 1992 and East bloc *perestroika* are undoubtedly unrelated and their timing coincidental, it is not unlikely that these two "liberalizing" developments could feed upon each other. East European countries have already indicated an interest in establishing a more formal relationship with the EC. Eastern Europe provides a natural market for the increased production of high-tech goods which Europe 1992 is expected to stimulate. West Germany, in particular, would like to sell its high-tech production to the Soviet Union as well as to Eastern Europe. However, trade flows two ways. It also depends on their producing the kind and quality of goods for which there is a market in the EC. Currently, Eastern Europe and the U.S.S.R. generally lack the requisite productivity and technology.

If *perestroika* is successful, which essentially means that market forces progressively and systematically replace bureaucratic decision-making, it will be easier for Western and Eastern Europe to establish, or even formalize, closer economic ties. In this event there may well be special implications for the minerals and metals sector. The East, particularly the Soviet Union, is much richer in raw materials than are the EC Member States. Currently the inefficiencies and disincentives associated with state planning and ownership have prevented East European countries from becoming important net exporters of minerals. Although the Soviet Union "experimented" a few years ago with dumping nickel on the world market, it found that a "spoiled market" does little to increase needed foreign exchange. Currently, the Soviet Union has to rely on net imports of some minerals, such as zinc, because its inefficiently operated mines cannot meet domestic requirements.

The current state of their economies largely frees Canadian mining and metal sector firms from serious concerns that their EC markets will be challenged from the East in the near future. In addition, mines in the Soviet Union are not located near port facilities, thus creating transportation cost problems. Moreover, a threat to Canadian minerals and metals markets in the EC probably awaits substantial foreign investment in these sectors of the East bloc economies. But, given the sunk costs involved, large amounts of foreign investment are unlikely to flow into their mining sector while political instability persists and until there is a wider acceptance of profit-making.

Nevertheless, the East-West trade picture is in the process of changing. While it is unlikely that the East's mining industries could mount a challenge without foreign investment, including technology, provided by Western world mining firms, those nations which wish to trade with the EC will have an incentive to plow back foreign earnings into investment in Eastern Europe. Trade is two-way: greater exports to the East require either greater imports from and/or capital exports to Eastern European economies. Already there is some movement. Hungary is attempting to build up its aluminum fabrication industry. Poland is a net exporter of refined copper and has large quantities of coal to sell, albeit of the dirty, high sulphur variety. Finally, as part of an easing of East-West tensions, Western political leaders, such as Canada's Prime Minister, have encouraged national firms to give the Soviet Union a close look in their global investment plans.

There is, then, little likelihood that in the near future Europe 1992 and Eastern democracy and *perestroika* will conjoin to pose major marketing problems for Canadian minerals and market sector firms with important European markets. But the picture is somewhat different in the long run. It is not beyond the realm of possibility that if *perestroika* succeeds, the

Soviet Union in particular, could eventually become a source of minerals to the EC. At such time, the Canadian minerals and metals firms could find their Canadian exports challenged from the East in European markets. However, if the challenge comes, it will likely come from Eastern European and Soviet mining firms in joint ventures with Western mining firms, among which one would expect to find Canadian firms.

5.4 Environment and Health

Europe is among the most sensitive areas in the world to environmental degradation and health hazards arising out of economic activity. Because Europe is a small area with a large population and a high rate of economic activity, environmental damage is much more likely to be concentrated than in relatively land-rich, population-poor areas of the world such as Canada. The damage done by air pollutants such as sulphur dioxide to the Black Forest of West Germany is only one of the most prominent of environmental concerns within the EC.

The mining and metal sector is an important contributor to environmental damage. Iron- and steel-making, the smelting of non-ferrous ores and concentrates, and the reliance on coal for electric power generation contribute significantly to air pollution in the EC. While steps are being taken to reduce pollution, one might ask whether it would not be cheaper for Europe to move slowly toward greater reliance on imports of unwrought metals, leaving the smelting of non-ferrous metals and basic steel production to those that mine the ores. European production could then focus on downstream fabricating activities.

Although the answer is that it may well be cheaper for the EC to import rather than produce unwrought metals, there is little evidence that there is a move away from metal-making self-sufficiency. The EC continues to place tariffs on imports of unwrought as well as wrought metals -- but not on ores and concentrates. (It will be interesting to see how the EC responds to pressures in the current GATT round of multilateral trade negotiations to reduce or eliminate tariffs on unwrought metal.) There is continued promotion of non-ferrous industries such as aluminum where Pechiney in conjunction with Électricité de France is constructing a new state-of-the-art aluminum smelter at Dunkirk. The betting is that EC Member State policy will be to generally replace existing pollution-prone, metal-making capacity -- much of which is getting old -- with more efficient, and less pollution-prone, capacity. Nevertheless one can expect some reduction in EC reliance on its own smelting capacity. To some extent this represents an environmental initiative. However, the main environmental "initiative" will be the increased use of scrap, particularly as the mini-mill sector of the steel industry grows and as the non-ferrous metals recycling industry expands.

In addition to the environment, the minerals and metals sector must cope with health concerns. This report alluded earlier to the existence of known or alleged health hazards associated with the handling or use of several minerals and metals, including asbestos, cadmium, nickel, lead and mercury. The minerals and metals sector is acutely aware of these health concerns and is moving to meet rising standards. In the case of lead, which is chiefly used in starter batteries, the industry's solution is to seal the batteries and to establish special recycling plants so that lead in used batteries can be put back into sealed, reusable form. Although the nickel industry is sceptical about the alleged carcinogenic effect posed by its product, it cannot avoid the concerns these allegations have raised. However, the industry finds it difficult to take seriously outright bans, such as the ban levied by the Danes, on the use of nickel, which is vital in the production of stainless steel and in the functioning of jet engines.

5.5 New Materials

It is widely appreciated that scientific developments in the plastics and ceramics fields pose a potential challenge to many metals in some of their existing uses. Speculation that automobiles may someday be made of plastic not only implies a reduced demand for steel, but, in turn, implies a reduced demand for zinc, which is used to galvanize steel and to make engines more heat-resistant. The heat-resistant, corrosive-resistant, and hardness properties of ceramics make them a potential competitor for steel and aluminum. In fact, the alumina stage in the production of aluminum produces a fine particle that can be used in the production of certain ceramics.

Minerals and metals sector firms are actively involved in R&D. Some firms such as Alcan and Stelco have turned part -- albeit still a small part -- of their R&D effort toward ceramic development, particularly where it will complement their metal-making activities. But the main thrust of product-related R&D in the metal-making sector is toward the improvement of the quality of the metal itself. Advances in metallurgy have led to the upgrading of alloys to make them lighter, stronger, and more heat- and corrosion-resistant. For non-ferrous metal producers such as Cominco (zinc) and Inco (nickel), demand for their product will remain high as long as steel itself is not displaced as a basic material. Like other metal producers Cominco has done R&D into new materials. However, serious effort implies a willingness to diversify, a strategy which is less in vogue today than it was in the 1970s. For this reason leading metal firms are likely to concentrate their R&D on what they really know: metals. For the most part, the challenge to metals will probably come from R&D done outside the metal industry.

SUMMARY AND CONCLUSIONS

The Canadian minerals and metals sector is well-prepared to meet the challenge of increasingly globalized competition. It should be able to take advantage of whatever increase in demand for raw materials Europe 1992 creates. However, Europe 1992 is unlikely to change existing patterns of trade between Canada and the EC. Europe 1992 does not change external trade barriers, which favour mineral imports relative to metal imports. EC metal-making self-sufficiency is backed up by an existing capitalized industry, European metallurgical expertise, work force capabilities, and a long history of training and apprentice programs. These are difficult for North American firms to rival.

Canadian mining and metal firms are likely therefore to remain chiefly mineral suppliers to the EC, including those few cases (e.g., Inco) where Canadian mineral producers have an EC subsidiary. Most of the non-ferrous metal from Canadian smelters and refineries will continue to flow south of the border, albeit that firms such as Noranda and Cominco do make some arm's-length metal and mineral export sales to the EC.

Finally, non-integrated Canadian metal fabricators will almost surely require a presence in at least one EC Member State if they wish to make substantial EC sales. However, because most non-integrated fabricators are small firms, and because European fabricators are relatively efficient, there may be limited opportunities for Canadian penetration of the EC market at this level. The main exception is aluminum where a fully integrated Alcan already has a network of production facilities in the EC. For most other metals, the main opportunity open to Canadian firms is to forge some form of alliance with EC fabricators, the Canadian firm capitalizing on its comparative advantage in, or access to, mining and basic metal production, and on the EC firms' comparative advantage in metal-working expertise.[21]

On the whole, Europe 1992 will not be as dramatic an event in the minerals and metals sector as it is expected to be in some high-tech fields such as telecommunications and computer goods and services. Rather, for the Canadian minerals and metals sector, Europe 1992 is another step in a process of economic liberalization that is replacing the penchant for economic intervention that characterized much of the post-World War II period. But although economic liberalization typically encompasses (international) trade liberalization, the nature of Europe 1992 is unlikely to have much direct impact on Canadian minerals and metals sector trade with the EC. Moreover, Europe 1992 contributes to the growing importance of large trading blocs. In doing so, however, it may prompt more numerous global alliances among minerals and metals sector firms just as it is doing in other industrial sectors such as telecommunication equipment and computers. In this process, Canadian firms, with rich mineral deposits and advanced technological know-how, can expect to prosper.

There remain some unknowns: the minerals and metals provisions, if any, in the Uruguay Round of GATT negotiations; environmental and health regulations; new materials; and the impact of developments in Eastern Europe and the U.S.S.R. Each is quite independent of Europe 1992, yet may affect the latter in some as yet undefinable manner. Each constitutes a potential "cloud" of some proportions, but how big and dark is hard to say. Each has been dealt with at least briefly in the body of the report -- and needs little more said in conclusion, except perhaps with respect to the GATT issue.

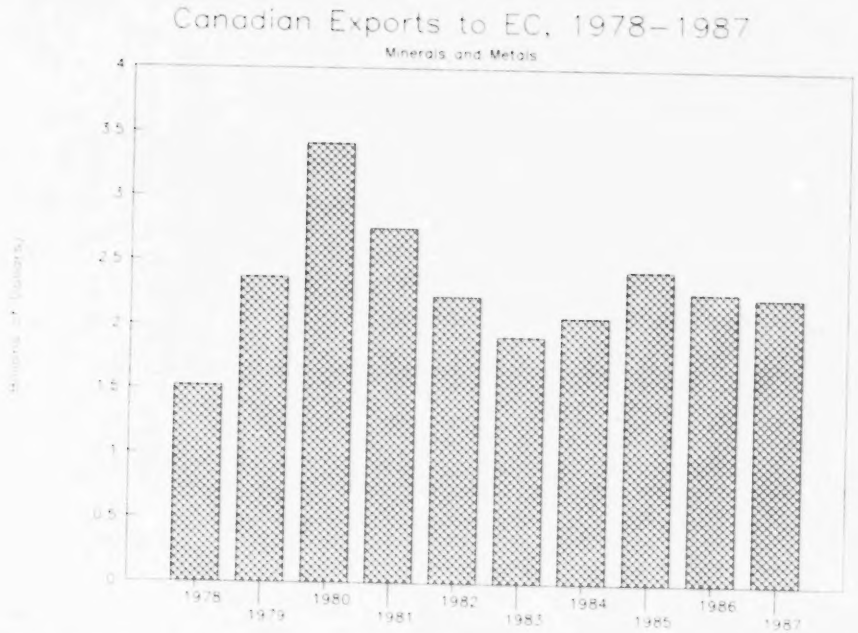
Europe 1992 does not constitute a change in climate for extra-EC firms selling minerals to the EC. It may constitute a change for firms selling unwrought and

wrought metals to the EC, if European metal firms are made more efficient in production (via economies of scale) or marketing (reduced border controls). But, in the view of some observers, the main problem facing Canadian mineral and metal producers is that it is difficult to sell large quantities of metals, as opposed to minerals, to any buyer other than in the U.S. The current set of EC tariffs, for example, rises with value added and thus makes "effective" tariffs higher than "nominal" tariffs. When this fact is combined with the problem of competing against Third World mineral suppliers which are often state-owned or subsidized, and the tendency for trade negotiators to focus on the manufacturing and service sectors, there is at least a small grey cloud on the Canadian minerals and metals sector horizon.[22] Arguably, then, what is needed is not so much a Canadian response to Europe 1992 as such, but a successful Canadian government policy response to mineral sector trade relations in the current set of GATT negotiations.

APPENDIX

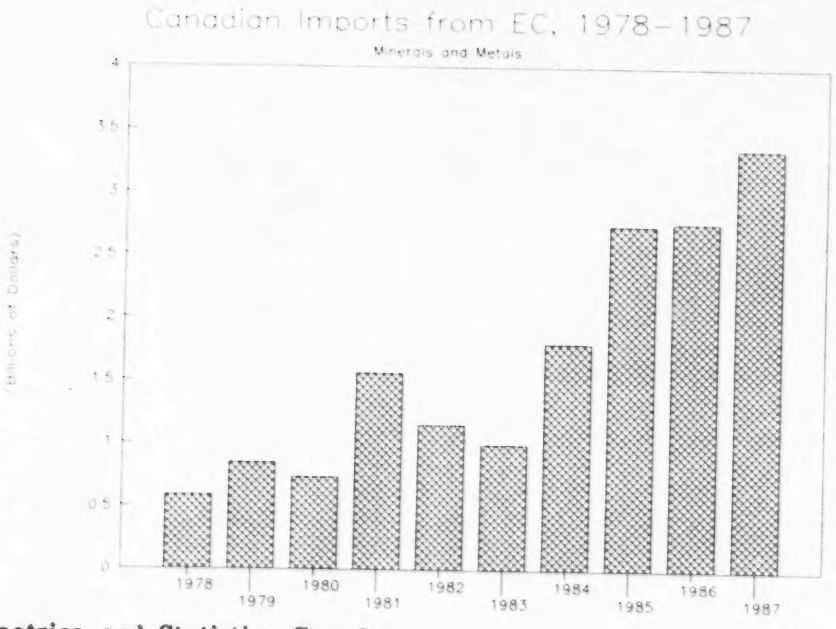
FIGURES

FIGURE 1



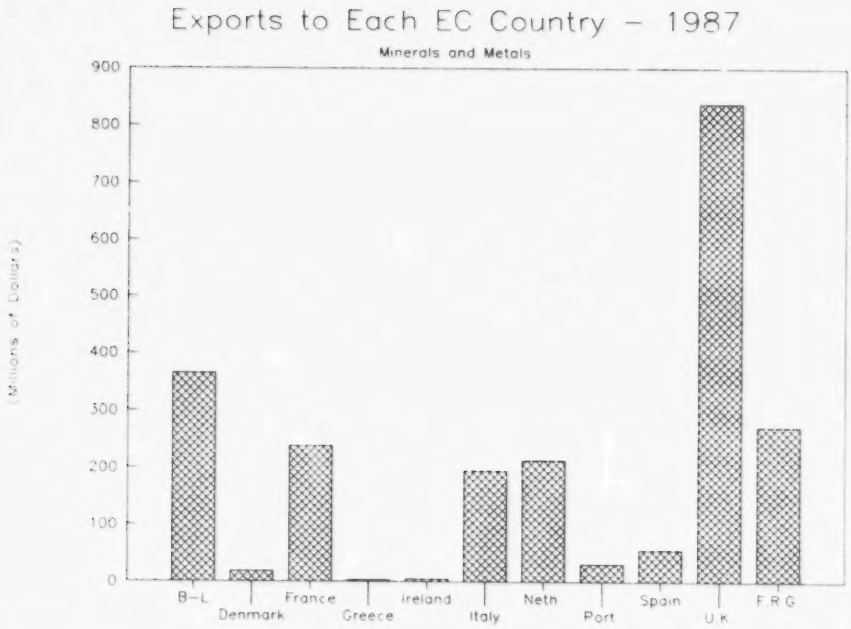
Source: Informetrica and Statistics Canada.

FIGURE 2



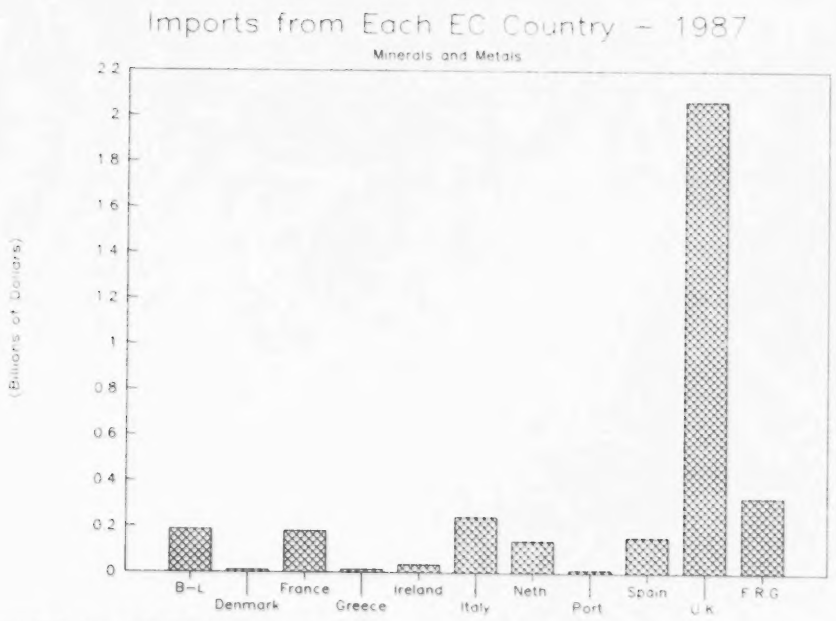
Source: Informetrica and Statistics Canada.

FIGURE 3



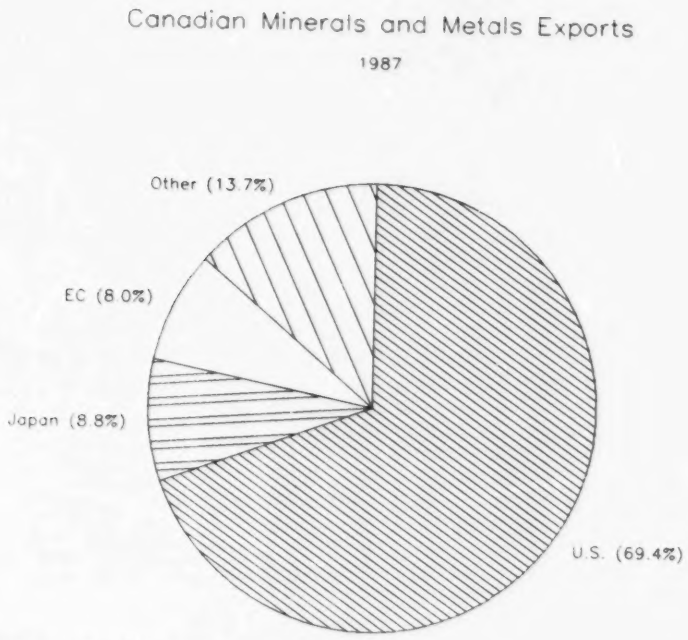
Source: Informetrica and Statistics Canada.

FIGURE 4



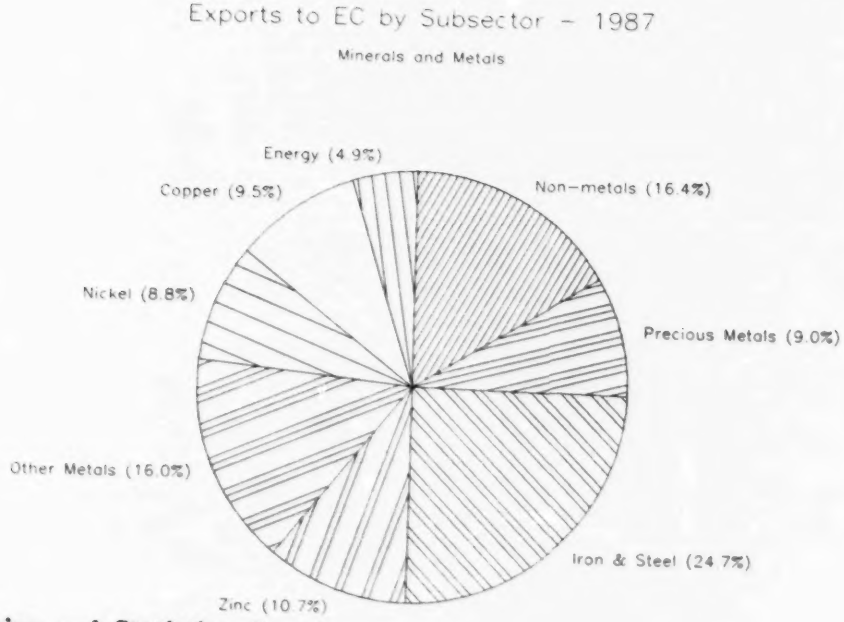
Source: Informetrica and Statistics Canada.

FIGURE 5



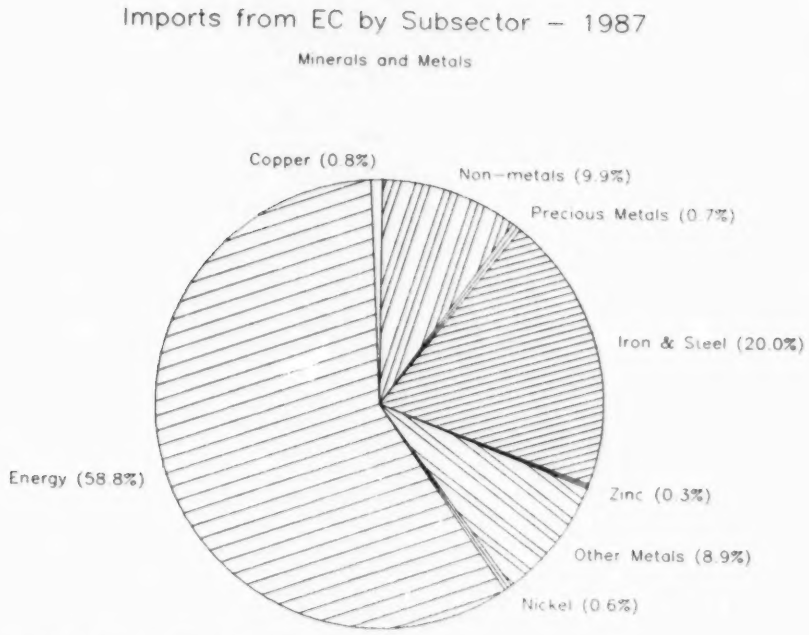
Source: Informetrica and Statistics Canada.

FIGURE 6



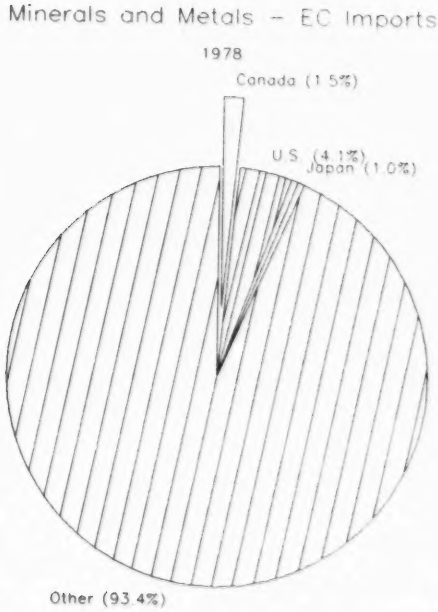
Source: Informetrica and Statistics Canada.

FIGURE 7



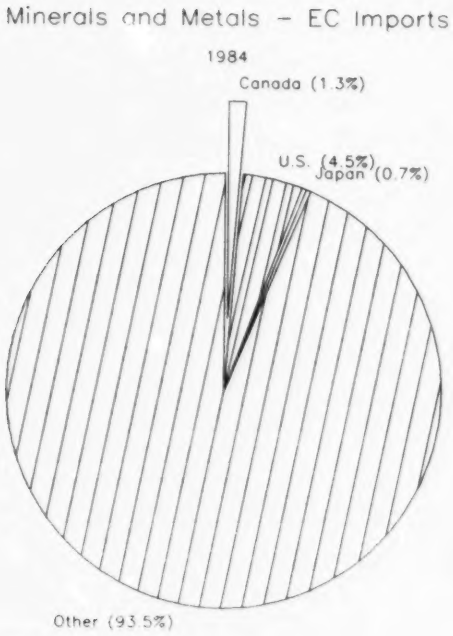
Source: Informetrica and Statistics Canada.

FIGURE 8



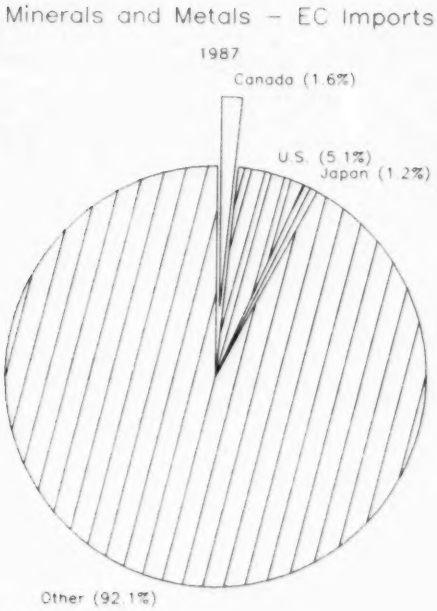
Source: Informetrica and Statistics Canada.

FIGURE 9



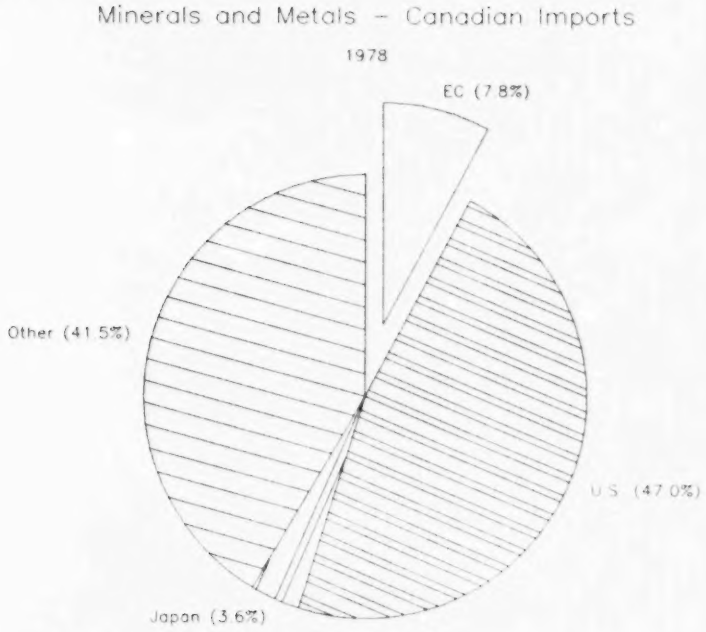
Source: Informetrica and Statistics Canada.

FIGURE 10



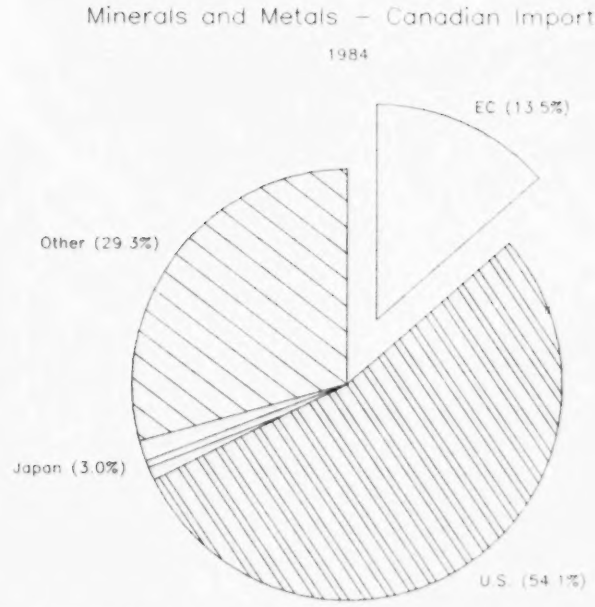
Source: Informetrica and Statistics Canada.

FIGURE 11



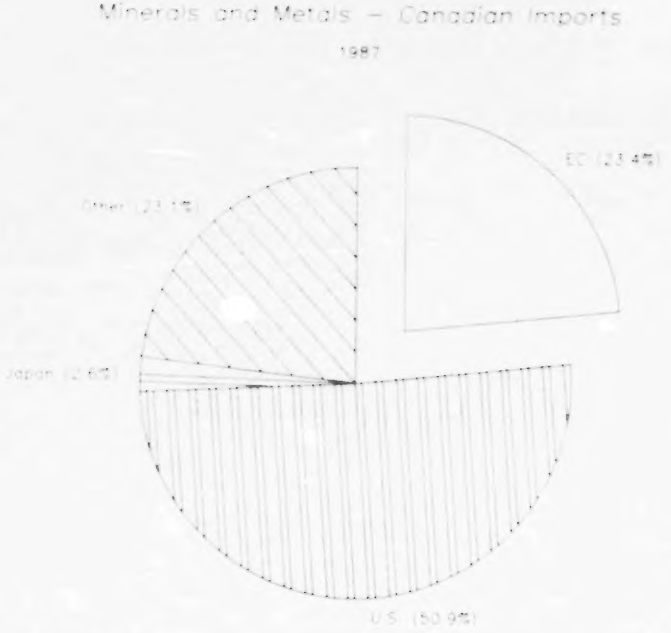
Source: Informetrica and Statistics Canada.

FIGURE 12



Source: Informetrica and Statistics Canada.

FIGURE 13



Source: Informetrica and Statistics Canada.

NOTES

1. European Commission, *The Economics of 1992* (Cecchini Report), Brussels, 1988, p. 19. A more recent study concludes that the Cecchini Report estimates may be conservative. Richard Baldwin, "The Growth Effects of 1992," *Economic Policy*, No. 9, October 1989.

2. *Panorama of EC Industry 1989*, pp. 2-15.

3. Interdepartmental Working Group on Minerals and Metals, *The Impact of Europe 1992 on Canada's Mineral and Metal Sector*, IV-1.

4. Interdepartmental Working Group on Minerals and Metals, *The Impact of Europe 1992 on Canada's Mineral and Metal Sector*, Ottawa, May 1989, pp. 2-3.

5. T.R. Howell, et al., *Steel and the State: Government Intervention and Steel's Structural Crisis*, (Boulder, Colorado: Westview Press, 1988), pp. 55-56.

6. Howell, et al., p. 56.

7. ISTC, *Primary Iron and Steel Industry*, Industry Profile 3001, p. 2.

8. In 1956, the Treaty of Rome established a common market among the original six members of the ECSC.

9. Interdepartmental Working Group on Minerals and Metals, V-5.

10. *Panorama of EC Industry 1989*, p. 17.

11. *Panorama of EC Industry 1989*, 27:27.

12. These estimates are found in pamphlets issued by the Canadian Association of Recycling Industries (CARI), *Scrap: The Reliable Resource* and *The Second Time Around: The Story of Recycling in Canada*.

13. We are indebted to W.E. Koepke of the Department of Energy, Mines and Resources for providing us with a copy of a short paper (forthcoming in *World Mineral Notes*, 1989) on the subject of the EC mining memorandum.

14. See Alan Green and Ann Green, "The Sun is Rising, Not Setting, on Metal Mining," *Financial Post* August 23, 1989, p. 11. This article is based, in part, on the authors' study, *Productivity and Labour Costs in the Ontario Metal Mining Industry, 1975 to 1985: An Update*. Mineral Policy Background Paper No. 25, Ministry of Northern Development and Mines, Ontario, Sept. 1987.

15. ISTC, Industry Profile 3012, p. 3.

16. In the newly developing field of "direct steel-making" in which coal and other minerals would be smelted into steel in a single step, the U.S. is viewed even farther behind the Japanese and European steel industries. One U.S. steel expert has said that "the American steel industry is so far behind in research and development that it is doubtful it can ever catch up." *New York Times*, August 7, 1989, D1.

17. A.C. Masi, *Structural Changes in Canada's Primary Iron and Steel Industry*, 1970-1986 McGill University (mimeo) p. 32.

18. For some firms the metals tariff is a "nuisance factor," for others it is a real barrier to exports.

19. "Small Companies Going Global," *New York Times*, November 27, 1989, D-1, D-5.

20. Another example is that of Tasminco, formed from a merger of three Australian mining firms, Electrolitic Zinc, North Broken Hill, and CRA. Tasminco has joined with the Dutch firm Budell in lead and zinc metal processing operations in Holland and in the U.K.

21. On comparative advantage in metal mining see Carmine Nappi, "Changing Patterns and Determinants of Comparative Advantage in North American Metal Mining," *Resources Policy*, March 1989, pp. 24-44.

22. See Alan Green and Ann Green, "GATT and the Canadian Mineral Industry," *Financial Post*, October 1989.